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Committee Prevents Auction of Abitibi Co.

Privy Council in London Allows Appeal of Company and Blocks Public Sale of Concern — Ruling Based on Point of Law—New Compromise Plan May Arise—Operating Profits Lower in 1942.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., July 12, 1943—The judicial committee of the privy council at London, England, on July 8, allowed the appeal of the Abitibi Power and Paper Company, Ltd., from the judgment of the Ontario appellate court and Mr. Justice Middleton, thus preventing the sale by public auction of the assets and undertakings of the great $138,000,000 corporation, as sought by the bondholders.

The judgment also sets aside the ruling of Mr. Justice Middleton and the Ontario appeal court that the Abitibi Power and Paper Company, Ltd., Moratorium Act, passed by the Ontario legislature in 1941, was ultra vires of the legislature.

In addition, the Montreal Trust Company, plaintiff in the action, was ordered to pay the costs, not only during the privy council appeal, but also during the previous litigation.

Ruling Based on Point of Law

The main premise on which the ruling of the privy council was based was rejection of the plaintiff's contention that the winding up of the Abitibi company's affairs fell under federal laws and therefore could not be stayed by Ontario legislation. Thus the privy council ruled that the Ontario legislation, aimed at the protection of Abitibi shareholders and other interests, was valid.

The privy council judgment said that the action to wind up the company's affairs was originally a mortgagee's action brought in the Ontario courts. Thus it was subject to provincial laws, which might be altered by the legislature.

It will be remembered that the company went into receivership in 1932 and after an investigtaion by a Royal Commission, before which appeared numerous committees, representing bondholders, shareholders, creditors, etc., the Ontario government and the liquidator, R. S. McPherson. Following the report of the commissioners, the Montreal Trust Company, in behalf of the bondholders, took action to enforce the sale of the company by public auction. Existing provincial legislation was powerless to prevent the sale, which gave rise to the passing of the moratorium act. In the meantime the first offering of the properties for sale, subject to a reserve bid, proved abortive. Justice Middleton and the appellate court both having ruled in favor of the sale, the case was then carried to the privy council.

Foresee New Compromise Plan

Competent authorities express the opinion that the major result of the decision of the privy council will be a new compromise plan in which an equity for preferred and common shareholders will be maintained. Several reasons are given for this view. First, that the highest court having declared the moratorium act valid, the sale by auction of the properties is effectively barred. Secondly, it is believed that the decision will satisfy bondholders that all has been done in their behalf that can be done. Lastly, it is believed that a settlement that will relieve the company of receivership will be welcome to many holders.

Abitibi was in the limelight the following morning in Toronto stock exchange trading, with the turnover at noon running at 6,125 in the common and 6,260 in the preferred. Both made appreciable gains at the opening and held them through the mid-day. The price of the bonds changed hardly at all and this is regarded in financial circles as indicating that the bonds are not overvalued, despite the privy council's decision.

Operating under war restrictions, newsprint production of Abitibi and wholly owned subsidiaries for 1942 totalled 412,873 tons, as compared with 454,840 tons in 1941. Of the newsprint so produced, 72,980 tons were supplied to other newsprint manufacturers and/or customers thereof.

In his report for the year, the receiver and manager states that "present prospects are that the aggregate production and shipments of Canadian newsprint mills will likely be less in 1943 than they were in 1942."

The receiver observes that from March 31 last, the price to be permitted to be charged in the United States for newsprint was increased to $54 per ton,

(Continued on page 36)

Committee Formed to Aid Forest Industry

Group Known as Wisconsin Forest Products Information Committee Organized to Handle Many Problems Arising from War—No State Forest Aid to Counties—Thilmany Cited for Salvage Work.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., July 12, 1943—Outgrowth of a series of conferences in Wisconsin dealing with the slump in logging is the establishment of an industry committee whose purpose will be to keep itself and the mills informed on every development that affects the situation.

This group will be known as the Wisconsin Forest Products Information Committee and it will establish its headquarters at Oshkosh, Wis. It is expected the committee will work closely with the Northern Hemlock and Hardwood Association, which maintains offices in that city also.

Meetings were held at Rhinelander, Green Bay and Wausau in which paper and woodworking manufacturers, timber operators and others met with labor leaders, OPA and other government officials, forestry executives to seek a readjustment and coordination that would permit increased cutting of timber this winter. The crux of the problem seemed to be that loggers were leaving the woods for higher paid industrial jobs, with timber operators unable to raise wages and meet this competition because of price ceilings.

The committee will devote considerable study to manpower problems, and also will maintain close observation over all activities affecting continued production of pulpwood, lumber and all other forest products in Wisconsin, upper Michigan and Minnesota. An acute pulpwood shortage faces the mills unless they can replenish their stock piles early next year.

No State Forest Aid To Counties

Wisconsin counties which maintain forests and reforestation programs will not receive the additional state aid on which they were figuring as the result of action by the Legislature. Governor Walter S. Goodland has vetoed a bill which would increase the forest crop aids from $142,500 to $190,000 annually. It would have given counties ten cents per acre annually for lands set aside for forests, against an average of seven cents paid now. Recently the governor also vetoed a deficiency appropriation measure alloting $45,000 to counties for the last fiscal year so their return would be insured at the full 10-cent rate."

Thilmany Co. Cited For Salvage Work

The Thilmany Pulp and Paper Company, Kaukauna, Wis., has been cited by W. R. Johnson, district supervisor of salvage operations for the War Production Board at Appleton, Wis., as a leading example of what can be accomplished. This company has turned in nearly a million pounds of iron and steel scrap, and nearly 24,000 pounds of brass and copper, besides felt, bags, burlap and papers.

Other mills in the Fox River Valley also have done a commendable job, Mr. Johnson said, commenting that the paper industry was one of the first to respond to the WPB appeal, under the leadership of the American Paper and Pulp Manufacturers Association. Mills have followed the national slogan, "If it hasn't been used in the last three months and if you can't find a use for it in the next three months, scrap it."

An educational campaign has made workers salvage-conscious, with the result that an immense tonnage has been located and turned in.

Files Injunction Over Power

The Wisconsin River Paper and Pulp Company, Neenah, Wis., has filed a petition in the circuit court of Dane County for an injunction restraining the Whiting-Plover Paper Company from interfering with operation of its power dam at Plover, Wis.

The petition alleged that the defendant firm caused interference by keeping its own dam gates too high. It asks the court to issue an order requiring the Wisconsin Public Service Commission to take action to abate the cause of the complaint.

First petition was filed with the state commission in 1938, and in May, 1943, the plaintiff company was notified that its remedy lay in an injunction suit rather than in commission action. Both mills receive their water supply from the Wisconsin River.

Mills Open After Holiday Closing

Production in Wisconsin Mills went back into high gear this week after a shutdown in a number of mills. They closed for the Independence Day weekend and many remained down for the entire week to give all employees a vacation. This is the first cessation for many months. Extensive repair and renovation crews were kept on the job to carry on needed work while the machines were idle.

Paper Men Reelected and Appointed

Leo O. Schubart, secretary-treasurer of the Neenah Paper Company, has been reelected president of the board of education at Neenah, Wis.

C. B. Clark, president of the Riverside Paper Corporation, Appleton, Wis., has been named on an advisory committee of 42 members who will promote the raising of funds in the state for the Wisconsin War Fund.

Engagements in the Paper Industry

Miss Polly Mahler, daughter of Mr. and Mrs. Ernest Mahler, Neenah, Wis., will be married August 28 to Richard E. Stafford, Neenah, who is an ensign in the United States Navy. Mr. Mahler is executive vice-president of the Kimberly-Clark Corporation.

The engagement has been announced of Jules J. Perot, research chemist for the Rhinelander Paper Company, Rhinelander, Wis., and Miss Ruth Shields of Chicago, Ill. The wedding will take place next March. Mr. Perot is a graduate of the Institute of Paper Chemistry, Appleton, Wis., where he received his M. S. and Ph. D. degrees, the latter degree this year. His fiancee is attending Lawrence College, with which the Institute is affiliated, and will be graduated next February.

Dr. C. B. Purves Goes to McGill

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., July 12, 1943—Of more than ordinary interest to pulp and paper manufacturers is the appointment of Dr. Clifford B. Purves, of the Massachusetts Institute of Technology, as E. B. Eddy professor of industrial and cellulose chemistry at McGill University, Montreal. He succeeds Prof. Harold Hibbert, whose retirement becomes effective at the end of August.

With the development of the Pulp and Paper Research Institute the E. B. Eddy professor has been, and will continue to be, intimately associated. This institute was reorganized three years ago by agreement between McGill University, the Dominion Government, and the Canadian Pulp and Paper Association, the object being to improve facilities for research in the field of industrial and cellulose chemistry. In this direction it has done notable work of value to the pulp and paper industry.

Dr. Purves was born in Scotland in 1902 and received both his baccalaureate and doctor's degree from St. Andrew's University, where his career was marked by great distinction. After two years in the United States as the holder of the Commonwealth Fund Fellowship, he returned to Aberdeen University as assistant to the late Prof. J. J. R. Macleod, but was later recalled to a position at the National Institute of Health in the United States. In 1936 he was appointed associate professor of organic chemistry at M. I. T.

Speaking of his appointment, Dr. F. Cyril James, principal of McGill University, said that during the past ten years Dr. Purves had published many scientific papers based on his research investigations and had won a reputation that now places him very high in the ranks of organic chemistry on this continent. He had, moreover, maintained close contacts with those who were engaged in industrial research in the United States, so that he was admirably qualified to play an important part in the development of the Pulp and Paper Research Institute. "It is hoped," added Principal James, "that the advent of Dr. Purves will enable us to move even more speedily forward toward the solution of some of the many problems that now confront us in the field of industrial and cellulose chemistry."

Paper Bags Replace Jute for Raw Sugar

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., July 14, 1943—Paper bags to replace jute bags for raw sugar have been the subject of recent experiments at Central Toledo, Cuba, under the auspices of a concern affiliated with the International Paper Company, according to a report to the Department of Commerce.

It was found that three multi-walled paper containers of 50 kilograms each are required to displace one customary 325 pound jute bag. Inclusion of one liner of asphalt impregnated paper is sufficient to make the bag moisture proof, for a short time, at least. Paper bags filled with sugar, when dropped from a height of about 20 feet suffered no apparent damage.

The manufacturers claim certain definite advantages in the use of paper containers for sugar, such as lack of loss through seepage, reduced danger of freezing and hardening of sugar, and clean emptying of the bags.

Issues New Pulpwood Amendment

WASHINGTON, D. C., July 14, 1943—Pulpwood not covered by any specific maximum prices regulation on pulpwood is subject to the pricing provisions of Maximum Price Regulation No. 348 (Logs and Bolts), the Office of Price Administration announced today.

Amendment No. 5 to Maximum Price Regulation No. 348 has been issued to bring such pulpwood clearly within the terms of the regulation.

The amendment becomes effective July 14, 1943.

Maximum prices are established as the "average prices paid by buying plants for each species and grade of logs and bolts during September and October, 1942."

Buying plants unable to determine their average prices on the basis of their own purchases during September and October, 1942, are required to write a letter to OPA for authorization and instruction in establishing maximum prices through submission of proposed ceilings.

Pulpwood not covered by Maximum Price Regulation No. 348, OPA said, is priced under the following regulations:

Maximum Price Regulation No. 257 (Woodpulp produced in or sold into the States of Minnesota, Michigan, and Wisconsin.)

Maximum Price Regulation No. 387 (Pulpwood Produced in South Carolina, Georgia, and Florida.)

Maximum Price Regulation No. 388 (Pulpwood Cut from Stumps in Certain Southeastern States). These States are Kentucky, Virginia, North Carolina, Tennesse, Alabama, Louisiana, Texas, Arkansas, and Mississippi.

Temporary Maximum Price Regulation No. 32 (Pulpwood Cut from the Stump in the States of Maryland, West Virginia, Pennsylvania and Ohio).

The scope of Regulation 348 also is specifically extended to cover sales or purchases of logs or bolts used for commercial purposes without processing, such as mine props, posts, fender logs, and the like, except when they are covered by another price regulation.

Amendment No. 5 to Maximum Price Regulation No. 348 (Logs and Bolts), Effective July 14, 1943.

Seek to Dismiss Rockford Mills Suit

ROCKFORD, Mich., July 12, 1943—Motion to dismiss the $50,000 damage suit of Rockford Paper Mills, Inc., and Herdman Gumbin against the city of Rockford was filed in circuit court Saturday, July 3, by attorneys for the defendant.

The action is an aftermath of last spring's floodwaters, plaintiff alleging that on March 16 the municipality, without first notifying the mill management, opened the gates of a power dam and released a quantity of ice and water that washed out the paper mill dam at Childsdale, one and one-half miles downstream.

In the motion to dismiss, the city's attorneys contend that the plaintiff, who is buying the paper mill property on land contract from the receivership of the American Home Security bank of Grand Rapids, is not entitled to sue in the capacity of the receivers' assignee. That right, they claim, is vested only in the owner. It is further asserted that a copy of the assignment from the receiver should have been attached to the declaration in the suit.

The motion asks the court either to dismiss the suit or require plaintiff to amend his declaration.

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending July 10, 1943

STOCKS

	High	Low	Last
A. P. W.	2½	2¼	2¼
Armstrong Cork Co.	39⅝	38	38
Celotex Corp.	14½	13¾	14
Celotex Corp., pf.	93	92⅛	92½
Certain-Teed Products Corp.	6¾	6½	6½
Certain-Teed Products Corp., pf.	55½	53¾	54¼
Champion Paper & Fibre Co.	24	21⅜	24
Champion Paper & Fibre Co., pf.	104½	104½	104½
Congoleum Nairn Co.	24¼	23½	24¼
Container Corp. of Amercia	23½	23	23⅜
Continental-Diamond Fibre Co.	15⅜	15	15
Crown-Zellerbach Co.	15½	15¼	15½
Crown-Zellerbach Co., pf.	94⅝	93⅝	94½
Dixie Cup Co.	15⅝	15⅛	15⅝
Dixie Cup Co., A.	44¾	43½	44¾
Flintkote Co.	20⅞	20⅛	20¼
Flintkote Co., pf.	105¾	105½	105¾
Robert Gair	3⅝	3⅜	3½
Robert Gair, pf.	13⅜	13⅛	13⅜
International Paper Co.	12¾	11⅞	12⅝
International Paper Co., pf.	59⅜	57¼	59⅛
Johns-Manville Corp.	86½	85¾	86
Johns-Manville Corp., pf.	132	132	132
Kimberly-Clark Corp.	32	31¼	31¼
MacAndrews & Forbes	27	26¾	27
MacAndrews & Forbes, pf.	....	....	....
Masonite Corp.	41¾	40¾	41¾
Mead Corp.	9¾	9⅜	9½
Mead Corp., pf. A-6%	85	85	85
Mead Corp., pf. B-5½%	74	74	74
Paraffine Companies, Inc.	42½	42½	42½
Paraffine Compaines, Inc., pf.	104¾	104½	104½
Rayonier, Inc.	15	13¾	14⅛
Rayonier, Inc., pf.	30	29⅜	29⅜
Ruberoid Co.	26¼	26	26⅛
Scott Paper Co	42¾	42¼	42¼
Scott Paper Co., pf.	113	113	113
Sutherland Paper Co.	....	....	....
Union Bag & Paper Corp.	11	10¾	11
United Paper Board Co.	5⅜	5¼	5⅜
U. S. Gypsum Co.	72⅜	71	71
U. S. Gypsum Co., pf.	....	....	....
West Virgnia Pulp & Paper Co.	15½	15⅛	15½
West Virginia Pulp & Paper Co., pf.	108½	107½	107½

BONDS

Abitibi Pulp & Paper Co. 5s '53	64½	63	63
Celotex Corp. 4½s '47	102	101½	102
Certain-Teed Products Corp. 5½s '48	100	99¾	100
Champion Paper & Fibre Co. 4¾s '50	....	....	....
International Paper Co. 6s '55	107½	107	107½
International Paper Co. 5s '47	104¾	104½	104½
Mead Corp. 3¾s '53	....	....	....
West Virginia Pulp & Paper Co. 3s '54	....	....	....

New York Curb Exchange

High, Low and Last for Week Ending July 10, 1943

STOCKS

	High	Low	Last
American Box Co.	8⅛	8	8
Brown Co., pf.	....	....	....
Great Northern Paper Co.	33¾	33½	33¾
Hummel-Ross Fibre Corp.	4¾	4⅜	4¾
National Container Corp.	12	12	12
St. Regis Paper Co.	4	3⅞	3⅞
St. Regis Paper Co., pf.	....	....	....
Taggart Corp.	4⅜	4⅛	4¼

BONDS

American Writing Paper Co. 6s '61	95	94⅛	95

Crown-Zellerbach Earns $2.16

The Crown-Zellerbach Corporation for the fiscal year ended with April, a consolidated net profit of $7,543,287 after all charges, equal to $2.16 each on 2,261,199 shares of common stock after preferred dividend requirements. This compares with $9,108,801, or $2.85 a common share, for the preceding fiscal year after setting aside out of earnings a reserve for wartime and other contingenes of $2,000,000. The company's principal business is the manufacture of pulp and paper.

Consolidated net sales amounted to $84,656,362, compared with $86,336,150 a year before. Production for the year, totaling 637,620 tons, registered a decline from the all-time high record of 715,342 tons established in the previous year.

Operating results for the past year fully reflected war conditions, the report explains. "As was to be expected," Louis Bloch, chairman, and J. D. Zellerbach, president, state in their remarks to stockholders, "Government controls, together with shortages and increased costs of certain materials and labor, resulted in reduced operations, production and earnings."

On April 30 indebtedness to banks had been reduced to $3,500,000, payable $500,000 on August 1, 1945, since prepaid, and the balance in semi-annual installments of $1,000,000 beginning February 1, 1946.

Current assets on April 30 totaled $34,309,385 and current liabilities were $8,609,461, indicating net working capital of $25,699,924, which compared with $22,311,059 a year earlier.

Rayonier Nets 72 Cents

Rayonier, Inc., and its wholly owned subsidiary, the Georgia Timber Company, reports a profit of $1,943,959 for the fiscal year ended on April 30.

The result, which is after all charges, including abnormal losses arising from abandonment and sale of plant assets and provision of $1,963,135 for Federal taxes on income, is equivalent to 72 cents a share on 963,871 shares of common stock after preferred dividend requirements.

In the preceding fiscal year the net profit was $3,762,970, or $2.60 a common share.

Consolidated net sales amounted to $28,777,865, compared with $31,316,906 in the previous year, and unit sales totaled 344,707 tons, against 408,590 tons a year ago.

Manufacturing costs greatly increased during the year due to a very rapid advance in the price of logs, pulpwood and other raw materials, Edward M. Mills, president, explained in his report to stockholders. The turnover of labor, both in the woods and in the mills, resulted in operating inefficiencies with accompanying cost increases. The rates paid labor were increased, he said, while there has been no increase in the prices received by the company for its products since June, 1940.

Schumacher Profits Off

The Schumacher Wall Board Corporation for the year to April 30, reports net income subject to possible renegotiation of war contracts, was $158,690, equal after preferred dividend requirements to $1.54 each on 66,000 common shares.

This compares with 260,297, or $2.76 a common share, for previous year.

National Container Nets $1.26

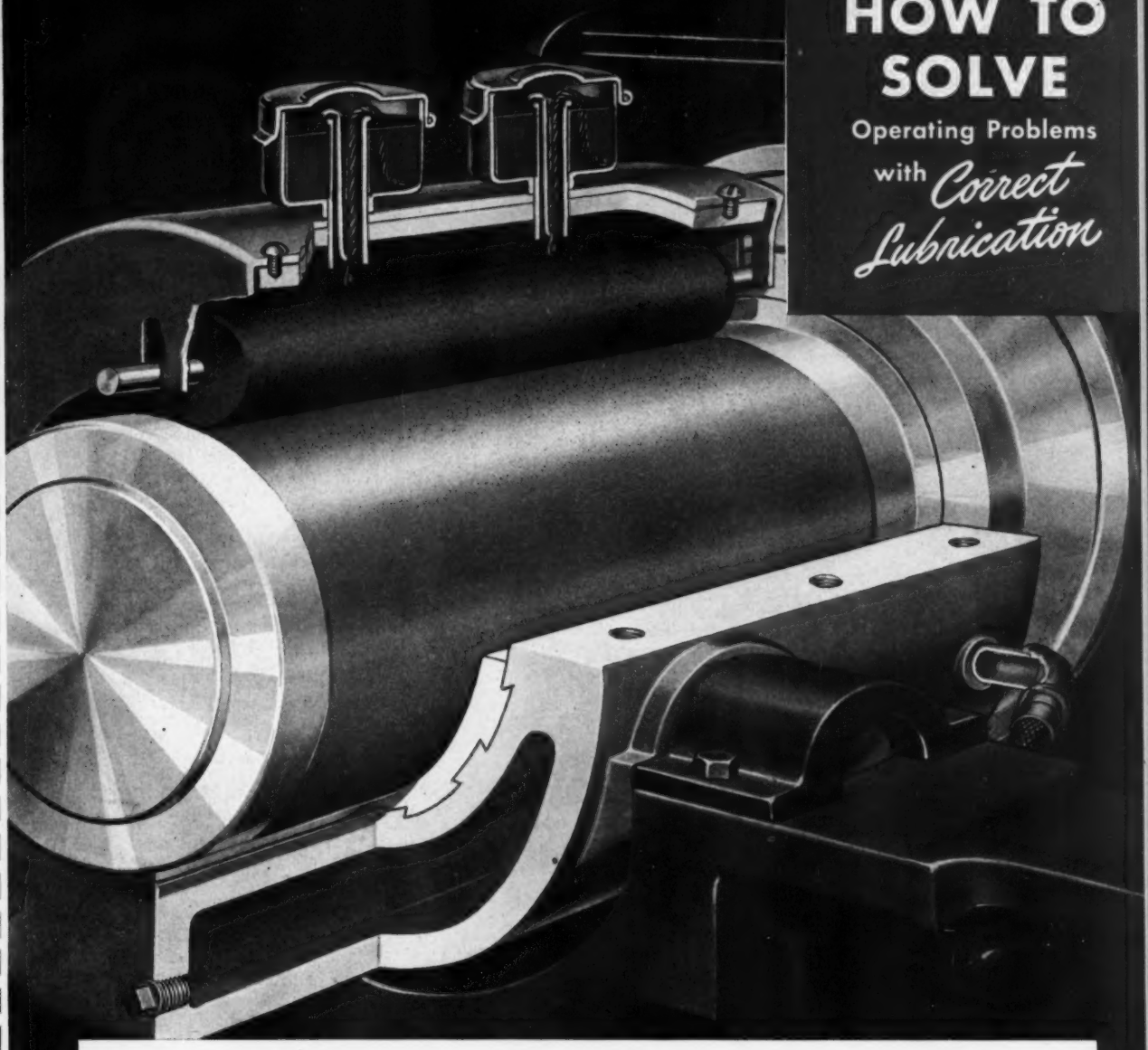
The National Container Corporation for the six months to June 30, report on estimated net profits of $300,000, or $1 a share; for like 1942 period, $418,060, or $1.26 a share.

ONE OF A SERIES OF SUGGESTIONS TO AID PRODUCTION

ONE OF A SERIES OF SUGGESTIONS TO AID PRODUCTION

HOW TO SOLVE

Operating Problems with *Correct Lubrication*



Use Oil Here that Stays Put!

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The lubrication of these bearings should be given careful consideration!

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Persistence-of-film describes the oil film that Gargoyle Vactra Oil forms because of its strong attraction for metals. This oil has an extremely persistent oil film that resists rupture under shock — *it stays put!*

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Use Gargoyle Vactra Oil in wick feed beater bearings and be sure of effective lubrication.

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CALL IN SOCONY-VACUUM

ANPA Reviews Newsprint Situation

The constantly changing newsprint situation makes a report at this time advisable, states the current review of the newsprint situation issued by the American Newspaper Publishers Association.

The necessity for the WPB order for a 5% reduction in newsprint consumption for the third quarter beginning July 1, 1943, arose from the failure of the original Limitation Order L-240 to bring about an actual reduction in consumption of 10% under 1941 consumption in corresponding quarters. The overall reduction of 5% in consumption for the first six months of 1943 made it necessary to have an overall additional reduction of 5%. In the light of what happens in July and August, both regarding supply and consumption, the Newspaper Industry Advisory Committee will have to consider a recommendation about the quota of newsprint to be allowed in the fourth quarter beginning October 1, 1943.

As to price, reports from Washington indicate that OPA has been giving active consideration to the applications of both United States and Canadian mills for an increase in price.

Regardless of the facts as they are interpreted to various publishers, it does seem that the matter of price is interwoven with the matter of supply from Canada. The Canadians have stated that they will continue to supply newsprint to the United States at the rate of 210,000 tons per month through the third quarter but they do not indicate in any way what they will do in the fourth quarter. There have been suggestions that the Canadians will reduce the tonnage going to the United States from 210,000 tons in the fourth quarter regardless of what price prevails. On the present basis Canadian mills are delivering 210,000 tons to the United States each month; 16,000 tons to Canadian consumers and 20,000 tons are provided for overseas, making a total of 246,000 tons.

Canada has not up to now undertaken any planned pulpwood cutting drive as is under way in the United States. If the policy is pursued by the Canadians of not taking any special steps to maintain the volume of wood cutting because of the manpower situation and the supply of newsprint from Canada to the United States is allowed to dwindle it can be seen that the Canadians will be making frequent and periodical visits to Washington demanding further increases in newsprint prices.

Chairman Nelson Refutes Mr. Maas

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., July 14, 1943 — Chairman Donald M. Nelson today issued the following statement:

"Congressman Maas is misinformed when he says there is censorship in the Printing and Publishing Division of the War Production Board.

"Nothing resembling censorship is practiced, directly or indirectly, by the War Production Board. The existing system of paper conservation orders has been devised purposely to avoid any possibility of censorship.

"We are faced with a diminishing supply of paper —what is printed on that paper is not within our province.

"Publishers of books, magazines, and newspapers all have a quota equal to approximately 90 per cent of the paper they have been using in the past. Under the published orders of the War Production Board they can print anything they choose on that paper.

"If publishers need paper in addition to their quota, they file appeals with the Printing and Publishing Division. In cases where undue hardship is proven, relief is granted. This is done without any consideration of editorial content.

"I am submitting at an early date a detailed report on the administration of this Division to Chairman Boren of the Subcommittee of the House Committee on Interstate and Foreign Commerce, which has been authorized to investigate the paper conservation program of the War Production Board."

Fibre Tape for Strapping

"Stur-D-Strap," a laminated fiber substitute for steel or wire strapping made by A. J. Gerrard & Co., has unusual strength and can be used for strapping all types of packages, weighing 90 lbs. or less. It is water repellent, has only 1% elongation which allows for selective tensioning and in actual tests has a tensile srength of 13,500 lbs. per square inch. It is particularly timely in view of the recent government order (M-261 June 8) prohibiting shippers from using, except under certain circumstances, steel strapping on packages less than 90 lbs.

Stur-D-Strap, while developed for use in the Gerrard Steelbinder, may be used in all types of steel strapping tools. It is available in 700 foot rolls, ¾ inch wide.

Gets Patent on Drinking Cups

Franklyn M. Dessart of New York, under date of June 8, 1943, was granted patent No. 2321284 on a sanitary seal for drinking cups. Application was made September 30, 1939, and the serial number is 297.264. The patent is officially described as follows:

"An annular sealing device for protecting drinking cups, singly and in nests. It consists of a simple covering for keeping the lips and exposed parts of the cups clean and sanitary until ready for use; with appropriate convenient tabs for easy dispensing and tearing off the covering to present clean sanitary lips, and assembled for reliability in operation; and is to be made of materials which will make their manufacture economical."

J. Bloom & Co. Buy Building

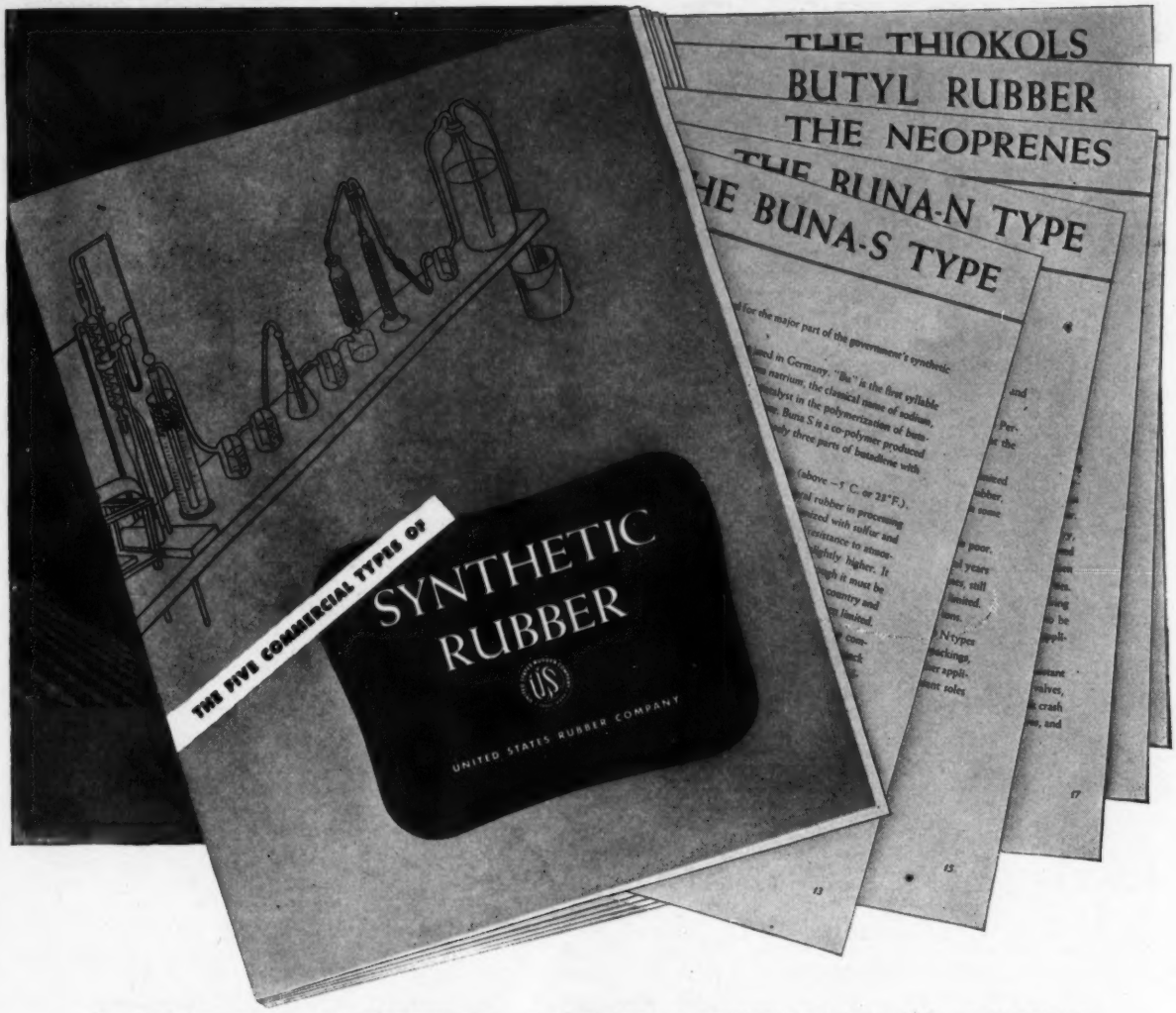
[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., July 12, 1943—J. Bloom & Co., general paper merchants, have bought the building formerly occupied by Holliston Mills, Inc., at 529 Atlantic Avenue, this city, with the expectation that they may have their warehouse and office there after the war. It is rumored that a large business interest will take over the entire block, including 125 Pearl Street, where the Bloom company is now located.

Container Corp. Sells Midwest Plant

[FROM OUR REGULAR CORRESPONDENT]

ANDERSON, Ind., July 23, 1943—O. V. Badgley, general manager of the Delco-Remy division of General Motors, has announced that the division has bought the idle Midwest Box plant here from the Container Corporation of America. The plant will be used for storage purposes and for some service operations.



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As the supply of natural rubber diminishes, undoubtedly more and more of the mechanical rubber goods used in paper mills will be made of synthetic rubber ... hose, belts, packings, rubber-covered rolls, rubber-lined tanks, pipes and fittings.

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You can get an over-all picture of the properties and characteristics of synthetic rubber in the new book recently published by United States Rubber Company. A request for "The Five Commercial Types of Synthetic Rubber" made on your company letterhead will be filled promptly. Address your letter to Dept. 13

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RALPH E. BRIGGS, Canton, Mass.
E. R. LELOFF, Vancouver, Wash.

Indianapolis Active

[FROM OUR REGULAR CORRESPONDENT]

INDIANAPOLIS, Ind., July 23, 1943—Demand for most grades of paper continued active last week with supplies restricted and prices on all grades governed by ceilings right up against the ceiling.

There has been a call issued by paper manufacturers in this state on the serious condition of the waste paper supply. Citizens of the state again are being urged to conserve all their old paper and put it back into circulation.

A shortage of labor, together with tire and truck difficulties has slowed down the collection of waste paper in this area to a considerable degree and it is expected, if the situation becomes more acute, civic bodies will be asked to aid in collections.

The demand for paper cups, napkins and other similar items took a decided upturn last week and it was not due to summer alone. Many of the swankier restaurants and some of the hotels in this section are going in for paper napkins in a big way, what with the laundry situation as it is. Hotels which maintain their own laundries still cling to the linen napkin, but they are conserving them in all ways possible.

Chain drug stores and the independents also are going in for paper soda and sundae glasses, hence the big increase in demand.

A further reduction in available supplies of newsprint will be felt here, according to publishers. The action was anticipated somewhat by the TELL CITY NEWS, which has announced that its circultaion list will be frozen as of August 1. New subscribers on this paper will be started only on the retirement of old subscribers.

Here in Indianapolis, the INDIANAPOLIS STAR now is taking back unsold papers. For some time this paper, the first in the state to take such action, had curtailed copies sent to retail outlets, including street salesmen and prohibited the return of unsold papers. Sometime later, the INDIANAPOLIS TIMES took the same stand. The STAR has revoked its ruling and considerable pressure is being brought on the TIMES, which has afternoon competition, to follow suit.

Joins Robert Gair Co.

George E. Dyke, president of Robert Gair Company, Inc., New York, N. Y., has announced that Philip S. Bolton has joined the company as research director.

"LIGNASAN" is a powerful, effective disinfectant. It controls slime from beaters to screens because it contains one of the most efficient fungicides and bactericides known. It is economical because it requires only a low concentration to defeat the formation of slime- and stain-producing bacteria and fungi.

For instance, three to five ounces of "Lignasan" per ton of fiber, dry basis, added to the beaters, is ordinarily sufficient to control slime at the wet end of the paper machine. And as a spot treatment a solution of "Lignasan" may also be bled into the system at those points where slime has a tendency to develop.

PULP PRESERVATION

From 4 to 8 ounces of "Lignasan" per ton of fiber, dry basis, added at the wet machine will protect laps or rolls from fungous stain for many months. Slush pulp is insured against spoilage caused by bacteria or fungi by mixing from 4 to 6 ounces of "Lignasan" per ton of fiber, dry basis, with the stock.

GET FACTS TODAY

Discover for yourself the many ways "Lignasan" can serve you, including: disinfecting felts during shutdowns . . . preventing the clogging of alum lines by biological organisms . . . prohibiting fungous infections which deteriorate invert sugars, starch sizes and adhesives . . . and by helping you conserve materials and manpower.

Write today. Learn how **"Lignasan"** controls bacteria and fungi, cuts costs, increases daily production, saves time. E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Department, Wilmington, Delaware.

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BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

PAPER
TRADE JOURNAL
Title Reg. U. S. Pat. Off.
Henry J. Berger
EDITOR

Vol. 117 July 15, 1943 No. 3

COMING EVENTS IN PAPER INDUSTRY

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, Fall Meeting, Palmer House, Chicago, September 21-24, 1943.

NEW ENGLAND SECTION. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

GOVERNMENT SPENDING

Government expenditures on the huge scale demanded to finance this war impose so heavy a burden of debt on Americans that constant vigilance should be taken to limit all unnecessary expenses and waste. The cost of war in the last fiscal year which ended June 30 totals about $85 billion. The cost for the current fiscal year as estimated by the Treasury Department totals $97 billion for war, $7 billion for non-war expenses, including $3 billion for interest and $5 billion for Government corporations, making a total of $109 billion. Plainly, this great expenditure cannot be made without exacting great sacrifice, hardship and financial strain on the taxpayers.

In a brief study of government spending, now and later, delivered in an address at the annual war meeting of the Chamber of Commerce of the United States, held in New York last April, Fred R. Fairchild, Professor of Political Economy at Yale University, said in part in reference to the post-war fiscal situation: "Government expenditures, close to $100 billion a year. A national debt of $250 billion, more or less. A monetary system which may be pretty shaky as it is right now, not being based on any intrinsic value standard. Inflation threatened, if not actually upon us. A budget out of balance by some $60 or $70 billion. A crushing burden of taxation. The impossibility of immediate reduction of expenditures. I remind you that the maximum cost of the World War was not reached until the year after hostilities had closed, and I remind you that after this particular war we shall, without any doubt, face extraordinary problems of mopping up and straightening out the world, far beyond anything we faced after the World War. Now suppose we ask ourselves the question: 'Can the American system survive this condition?' Some people are pretty hopeless about this. Others think that the system cannot survive, and are glad of it. Let us take the position of those who believe in the American way of life and would like to see it survive."

Continuing his analysis of the debt burden Prof. Fairchild went on to say that, "First of all, I think we must admit that our system cannot possibly survive if conditions such as I have stated should continue for any length of time. We cannot support a $100 billion annual expenditure by the national government. We cannot support in ordinary times a tax system such as we are now bearing for the sake of war. How about a debt of $250 billion? Many of my friends seem to think that here is the thing that is going to wreck us. I doubt that. I do not think a debt of $250 billion is necessarily fatal, but I am certain that we cannot go on adding $60 or $70 billion to it every year . . . I think that we could bear annual expenditures of $26 billion. But let us be sure of the implications. Let us not be smug or think that this is an easy program. It involves some very hard conditions."

Declaring that moderation is essential the speaker said that, "First of all we must abandon the idea of lavish expenditures for control of the business cycle, or for bringing about the 'new order.' I don't say for 'social reform,' because I don't want to be misunderstood. Social reform is very often understood to mean revolutionizing the social order and all that sort of thing. But the word 'reform' has another meaning, and I do not want to use any language that would seem to imply that we must forego all programs of reforming certain aspects of our economic or social system. Far from it! But we cannot spend billions of dollars in making over the world. That is what I mean. We must, for the same reason, abandon current grandiose notions of America policing the world, feeding the world, educating the world, playing Santa Claus generally. We must give up, I think, any parts of the 'Atlantic Charter,' and the 'Four Freedoms' which imply our performing indefinite and costly services for the rest of the world, and doing it for nothing. At home we must abandon the recently popular theory of deficit spending for the purpose of stimulating business and promoting prosperity. This is a large subject, but I have to be content with simply saying now that we cannot afford it. We shall have to face drastic curtailment of military expenditures . . . We must hold strict check on the growth of non-war expenditures. We must have a balanced budget. We must permit no repudiation of the public debt. We must continue the interest payments and we must start reducing the principal . . . We should have a sound monetary and banking system, both to promote confidence and to avoid inflation. This will be a tremendous undertaking. It will require courage and fortitude, far-sightedness, self-sacrifice. It will test the very fiber of our American nation. If we can come up to that test, then I think we need not feel that financial conditions alone are going to wreck us."

Pointing out that we have never had a real budget in comparison with the British budget, Prof. Fairchild advocated a joint Congressional Budget Committee as a fine idea, to be made up of members of the Ways and Means Committee and the Appropria-

tions Committees in the House, and the Finance Committee and Appropriations Committees of the Senate. "It would have," the speaker continued, "many important tasks, not the least of which would be to propose an amount for an over-all ceiling on the appropriations, without specifying particular details."

To Scrutinize Pulpwood Shipments

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., July 14, 1943—By order of the Canadian Timber Controller, Collectors of Customs are instructed to scrutinize all export shipments of pulpwood in order to ensure not only that such shipments are covered by proper export permits but also that the actual amounts exported are not in excess of the amounts specified on the permits, according to Customs Memorandum issued by the Department of National Revenue, Ottawa, according to a report to the Department of Commerce.

A quota of 1½ million cords of pulpwood has been established for export to the United States and in the interests of Canadian paper mills the Timber Controller is most anxious to see that this quota is not exceeded.

Hammermill Meeting Postponed

Hammermill Paper Company's annual conference with its Agents, held in August for more than thirty years, has been postponed until later in 1943. In a statement to its distributors Hammermill stated, "It is our understanding that new orders and directives will be coming out of Washington, and that the pattern of the industry will likely undergo some change. Just when action may be expected we are not able to determine at this time."

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks, 1943		Corresponding Weeks, 1942	
May 20	91.9	May 30	91.4
June 5 (incl. Memorial Day)	85.5	June 6	90.2
June 12	88.3	June 13	88.4
June 19	87.5	June 20	86.5
June 26	88.1	June 27	84.5
July 3	*80.0*	July 4	67.6

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1942	104.5	103.9	102.9	100.4	95.3	87.4	75.8
1943	87.2	88.8	89.5	88.7	91.5	*85.7*	...
Year		Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1942	80.8	82.8	90.6	86.9	80.1	90.4	
1943	...	...	...	...	...	...	...

COMPARATIVE YEARLY SUMMARIES

	1936	1937	1938	1939	1940	1941	1942	1943
Year to Date..	77.8	88.8	67.4	79.5	87.2	92.7	97.9	*88.6*
Year Average..	80.4	79.8	71.5	83.4	85.6	97.4	90.4	...

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separated tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS†

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1937	83	89	89	91	88	80	69	77	72	70	57	47	75
1938	56	63	63	60	60	59	59	60	70	73	67	61	64
1939	65	73	76	74	69	73	68	77	82	91	88	77	77
1940	78	75	74	76	82	85	77	79	78	85	82	77	78
1941	81	88	89	89	91	94	92	98	95	99	98	90	92
1942	102	101	101	95	82	72	68	75	76	81	82	77	84
1943	86	88	94	94	96	*94*							

Week ending May 29, 1943—95
Week ending June 5, 1943—92
Week ending June 12, 1943—97
Week ending June 19, 1943—95
Week ending June 26, 1943—96
Week ending July 3, 1943—*92*

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.

EXPORTERS
OF AMERICAN PULP

TO
BRITAIN
SOUTH AMERICA
AND ALL WORLD MARKETS

LYDDON
& COMPANY
(AMERICA) INC.

51 EAST 42ND STREET
NEW YORK CITY

NEW CYANAMID MELAMINE RESIN PROVIDES IMPROVED, LASTING "WET STRENGTH" IN PAPER

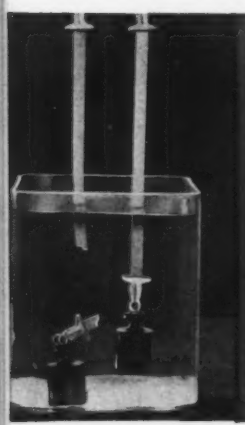
Cynamid's "secret" of providing "wet strength" to paper lies in the use of a special type of resin of exceptional efficiency which bonds fibers together so that they are highly resistant to separation when exposed to moisture. This new resin, developed in the Cyanamid laboratories, can be added directly to the fibers prior to the formation of the web. Thus without special equipment, manufacturers may turn out papers and packages that can replace and even improve upon the service qualities of critical materials.

This new resin, therefore, may be said to point the way to new usefulness for paper. Not satisfied, however, with the production of a material that would accomplish all this, research men in Cyanamid's paper chemical laboratories have by their diligent efforts been able to improve both the product and method of application.

Packaging papers, particularly where these are likely to be exposed to water such as in overseas shipments, have brought about an insistent demand for this new resin. Other fields of wartime use are for map, chart and blueprint papers . . . booklet stocks for field use . . . bandage and medical supplies . . . and other uses where resistance to inclement weather conditions is an important consideration. Here on the home front "wet strength" paper bags are replacing the traditional burlap for shipment to market of vegetables such as potatoes where vegetable moisture or wet weather might cause bursting of bags. It is likewise being used for tougher wrappings for meats and frozen foods . . . paper toweling and lens-wiping tissues.

Where strength (when wet) is the controlling factor governing basis weight of paper, the use of this resin will permit substantial reduction in basis weight with worthwhile savings in pulp.

For full details on the utilization of Cyanamid's new "wet strength" resin, see your Cyanamid representative or write to nearest Cyanamid office.



(Left) Here are "wet strength" tests as conducted in Cyanamid paper laboratories. Both papers have identical weights attached to the submerged ends. Unbroken paper strip at the right side of the jar is sample of stock made with new synthetic resin. It continued to hold the weight after days of submersion in water. The strip at left, fibers of which had not been "wet strength" treated, broke in three minutes after submerging.

(Left) Farmers were skeptical when potatoes were first sent to market in "wet strength" paper bags instead of the traditional burlap. But these bags have proven themselves to be strong and tough even when soaked through and through! As a result, not only potatoes, but other foods are being shipped this way.

(Right) Here, being subjected to water tests, are bags made of paper in which Cyanamid's "wet strength" resin is used.

American Cyanamid & Chemical Corporation

(A Unit of American Cyanamid Company)

30 ROCKEFELLER PLAZA · NEW YORK, N. Y.

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*Reg. U. S. Pat. Off.

Section of the
TECHNICAL ASSOCIATION
OF THE PULP & PAPER INDUSTRY

Edited by R. G. Macdonald, Secretary

The Production of a Structural Board by Gelatinization of Wood Wastes*

By Sydney Coppick[1] and Edwin C. Jahn[2]

Abstract

The production of a structural board from wood wastes is described. The process involved is the prolonged beating of the finely divided wood waste, such as sawdust. The rate of this process is studied in the presence of various agents. Methods are investigated for producing a molding material of high quality. Means for molding the material are described and the properties of the resulting boards are compared. The board produced has properties similar to those of vulcanized fiber. Compared with the original wood it is much harder and has approximately double the strength.

In logging, milling, chipping, and wood fabrication, concern has developed regarding the wastes which occur. Many attempts have been made towards the profitable utilization of these wastes, with considerable success.

The utilization of such wastes in the field of plastics, although a recent development, shows great prospects. Paperboard manufacture is firmly established although it has not as yet been able to use wastes of a small size due to the long fiber length requirement. A flooring material from ground bark, with mineral and rubber fillers, has been developed and offers promising possibilities. Success has been reported in the production of fine plastics from wood by making use of the lignin component.

However, the properties of wood indicate that greater possibilities lie in the production of a homogeneous mass, not depending upon a retained fibrous structure or previous history of the wood waste. If from this, one could produce, not a fine plastic, but a material approaching structural dimensions in size, then the problems of waste would be greatly eliminated. This material would find use for such purposes as flooring, panelling, siding and many other forms. It has been indicated that the ideal condition can be approached; namely that the sum total of the insoluble constituents of the wood could be used in the production of this material. Nothing could be more pleasing to the mill with wood waste problems than to have a method readily adaptable to standard equipment whereby, with 100% utilization, a material could be produced which had improved properties over, and adaptable to, the same and other uses as wood.

Despite the numerous uses to which wood wastes have been adapted, there is still room for many more profitable utilization methods, since vast quantities of waste wood are still left in the forest after logging operations and the sawmill waste burner still consumes material which might be put to a more profitable use.

Gelatinization of Wood

According to Schorger *(7)* gelatinized cellulose is a cellulose having a swollen gelatinous appearance. It may be opaque, translucent, or transparent, and when the fibrous structure is wholly or largely destroyed, it forms a dense horny product when dried en masse. Similar results are obtained with raw wood in place of purified cellulose.

The work of Cew *(2)* indicates that wood is more difficult to gelatinize than cellulose; however, unlike cellulose the gelatinization of wood is promoted by heat. Schwalbe *(11)* has patented a method for beating wood in the presence of oxidizing agents, such as nitric acid. Block *(1)* describes a method for gelatinizing wood in a colloid mill with alkali as a peptizing agent. Schorger *(8)* finds, by grinding wood in water in a ball mill, that the conifers are more readily gelatinized than the hardwoods, but that the accelerating effect of NaOH is more perceptible in the case of the hardwoods. Both bark and straw also may be gelatinized by beating in caustic solutions. Schorger *(7)* also finds that the greater the hemicellulose content of the wood the greater is the ease of gelatinization. He *(8)* described another method for gelatinizing wood by grinding in an earthenware mill wherein grinding was continued for from 24 to 48 hours at 2.5% consistency. In another paper *(9)* Schorger reports that the amount of pentosans removed from the wood, by grinding in dilute sodium hydroxide solution, is a function of the caustic concentration. Later, in a patent *(10)* he postulates that gelatinization by beating is due to the hydration and hydrolytic action of the alkali on the hemicellulosic component of the wood.

* A portion of a thesis submitted by the junior author[1] in partial fulfillment of the requirements of Master of Science from the University of Idaho, Moscow, Idaho, May, 1937.

The work described above was performed in the Wood Conversion Laboratory, School of Forestry, Moscow, Idaho, under the financial assistance of the Potlatch Forests Incorporated of Lewiston, Idaho.

[1] Member TAPPI; Acting Professor of Forest Chemistry, New York State College of Forestry, Syracuse, N. Y.

[2] Member TAPPI; Professor of Forest Chemistry, New York State College of Forestry, Syracuse, N. Y.

Schorger *(8, 10)* concludes that the beating of wood takes place in two stages: first, by chemical and physical action the wood acquires a particular affinity for water, and secondly it "combines" with water to produce a gelatinized product that dries irreversibly.

Production of Molding Material

Western white pine sawdust and shavings, previously hammermilled, was beaten at 6% consistency in various aqueous media. Samples of the product were taken from the mill at various periods of time and the degree of gelatinization determined as the water retained under pressure. The method used involves the measurement of the per cent water retained by a 2-gram sample of the wood when pressed in a mold at 5 tons per square inch under carefully controlled conditions. This method has been shown to be reliable as a measure of the action of beating *(6, 12)*.

Rod mill runs were made in a stainless steel mill in water, 1% NaOH and 5% aqueous phenol containing 0.1% HCl. The mill rate was 30 r.p.m. Similar beating runs were carried out at 12 r.p.m. in a rotary digester at 160°C. and 110 p.s.i. pressure. The results are given in Fig. 1.

In the case of beating in water the degree of gelatinization continuously increased with time. However, in phenolic media the beating action was more rapid in the early stages but soon gave a constant water retention. After 48 hours of beating in 1% NaOH solution the gelatinization was only slightly greater than that obtained with water alone. Previously, the rate curve for beating in alkali has been shown to be similar to the phenol curve, but has a higher constant value *(5, 6)*.

Beating conditions in the digester were slower than in the rod mill and at high temperature were further retarded. Phenolic media did not influence the rate over the short period investigated.

The gelatinized wood was washed to remove the beating media, filtered and pressed to a moisture content of 60% of its dry weight. This product was then molded according to various procedures. Strength and hardness of the molded products were determined *(4)*.

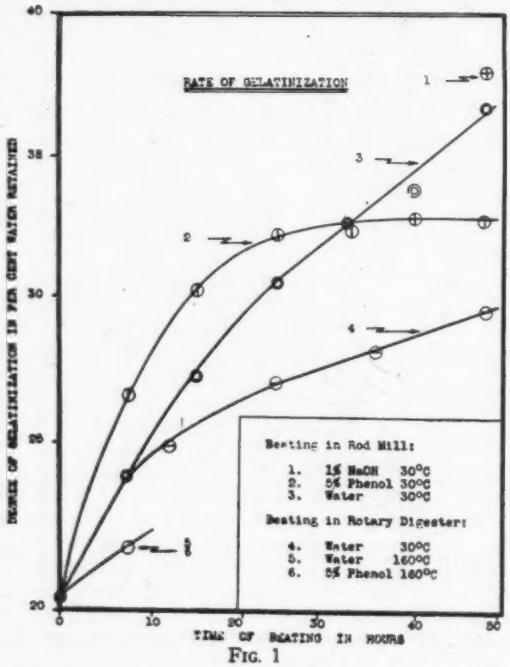
RATE OF GELATINIZATION
DEGREE OF GELATINIZATION IN PER CENT WATER RETAINED
TIME OF BEATING IN HOURS
Beating in Rod Mill:
1. 1% NaOH 30°C
2. 5% Phenol 30°C
3. Water 30°C
Beating in Rotary Digester:
4. Water 30°C
5. Water 160°C
6. 5% Phenol 160°C

FIG. 1

Note: Terminology Used in the Tables

M.R.: Modules of Rupture.
M.E.: Modules of Elasticity.
T.S.: Tensile Strength.
Shrinkage: Dimensional difference between mold size and final dry dimensions.
Hardness: Penetration of steel ball under a given pressure(5).

Molding Gelatinized Wood

SAWDUST BEATEN AT HIGH TEMPERATURE AND PRESSURE

1. *Cold molded and kiln dried:* Samples of sawdust beaten in the digester were molded at various pressures. Best conditions were found to be by slowly raising the pressure at the rate of 0.6 tons per square inch per minute. Drying was carried out in an oven under slight static pressure, slowly raising the temperature to 100°C. over a period of several days. The boards formed were sound and hard and had considerable strength. Increasing the extent of drying, molding pressure, thickness of board and mold drainage conditions all tended towards the production of stronger material. An example of the results obtained in this type of molding is given in Table I.

TABLE I.—SAWDUST BEATEN AT HIGH TEMPERATURE AND PRESSURE, COLD MOLDED AND KILN DRIED

Effect of Molding Pressure

Beating Medium	Molding Pressure, tons/in.²	M.R., kg./cm.²	M.E., kg./cm.²	T.S., kg./cm.²	Hardness, mm.	Density, gm./c.c.	Shrinkage, %	% Water Retained After Molding
Water (8 hours)	7.5	413	60,600	325	.39	1.28	5.05	20.0
	5.0	305	47,300	265	.45	1.31	4.89	19.9
	2.5	264	45,200	217	.59	1.18	5.20	23.5
	1.25	222	39,300	185	.95	1.16	5.54	26.2
5% Phenol (8 hours)	7.5	392	67,300	309	.41	1.33	4.48	17.7
	5.0	427	66,600	318	.52	1.30	4.56	20.0
	2.5	373	58,200	291	.69	1.27	4.79	21.5
	1.25	259	45,300	191	.81	1.11	5.35	25.5

2. *Hot Molded:* Similar experiments were conducted in a hot platten mold. Best molding conditions were found to be those wherein a vapor space is provided above and below the surfaces of the board by means of wire screens, and the sample is heated from one side only. Boards produced in this manner were stronger than kiln dried boards, but tended to be more brittle. Molding conditions of 1500 p.s.i and 200°C.

TABLE II.—SAWDUST BEATEN AT HIGH TEMPERATURE AND PRESSURE, HOT MOLDED

Effect of Molding Conditions

Beating Medium	Molding Pressure, tons/in.²	Molding Temperature, °C.	M.R., kg./cm.²	M.E., kg./cm.²	T.S., kg./cm.²	Density, gm./c.c.	Shrinkage, %
5% Phenol (8 hours)	3.75	raised to 120° during 20 minutes	549	74,250	450	1.62	6.05
	3.75-15 min. 7.5-5 min.	raised to 140° during 40 minutes	399	70,500	342	2.0	1.9
	3.75-15 min. 7.5-5 min.	raised to 200° during 12 minutes, allowed to cool to 185° during 8 min.	499	63,450	423	1.41	1.6
	0.75	200° for 2 hours	567	79,000	450	...	...

for 2 hours appear to be satisfactory. The results are given in Table II.

SAWDUST BEATEN AT ROOM TEMPERATURE AND PRESSURE

1. *Cold molded, air seasoned and kiln dried:* Gelatinized material was cold molded as before and air seasoned under slight static pressure for periods up to 2 weeks and finally kiln dried in an oven at 110°C. Molding at high pressures (2 to 7 tons per square inch) gave boards which checked and warped badly. A molding pressure of 1500 p.s.i. was found satisfactory. A minimum of ten days air seasoning appeared to be necessary before kiln drying could be accomplished without checking and warping. Incorporation of about 50% of various woody materials in the gelatinized wood decreased the strength of the resulting composite board to about one tenth that of the original pure material. Some of the results are given in Table III.

2. *Hot Molding:* Best conditions found for this method were 1500 p.s.i. and 200°C. for 2 hours.

TABLE III.—SAWDUST BEATEN AT ROOM TEMPERATURE AND PRESSURE, COLD MOLDED, AIR SEASONED AND KILN DRIED

Effect of time of air seasoning

Beating Medium	Molding Composition	Days air seasoned	Shrinkage, % Length	Shrinkage, % Width	M.R., kg./cm.²	M.E., kg./cm.²	T.S., kg./cm.²	Board Quality
Water (48 hours)	100% moist material (60% water)	5	11.2	14.1	501	55,400	446	checked & warped
		10	10.0	12.5	940	86,500	930	sound and flat
		14	11.2	12.5	1340	89,200	783	sound and flat
	40% moist material 60% dry ground material	14	6.9	7.8	108	12,800	91	sound and flat
	50% moist material 50% coarse sawdust	14	10.0	9.4	104	10,350	77	sound and flat
...o ...enol ...48 ...ours)	100% moist material (60% water)	5	...	...	478	34,100	237	checked & warped
		14	12.5	13.0	745	65,000	704	sound and flat
	46% moist 54% fine sawdust	14	1.56	1.70	83	5,100	78	sound and flat

Molding pressure at 1500 p.s.i.
Finally kiln dried at 110° C.

TABLE IV.—SAWDUST BEATEN AT ROOM TEMPERATURE AND PRESSURE, HOT MOLDED

Effect of Molding Temperature

Beating Medium	Molding Temperature, °C.	Molding Time, hrs.	M.R., kg./cm.²	M.E., kg./cm.²	T.S., kg./cm.²	% Water After Molding	Board Quality
1% NaOH 48 hr.	150	1.0	817	88,850	807	31.4	badly warped
	200	0.5	1192	107,700	1152	51.4	warped
	200	1.0	1271	116,700	1158	10.0	slightly warped
	200	2.0	973	108,500	925	8.4	sound and flat
	210	3.0	...	.....	...	1.6	blistered
	225	2.0	...	.....	...	...	blistered

Molding pressure 1500 p.s.i.

TABLE V.—SAWDUST BEATEN AT ROOM TEMPERATURE AND PRESSURE, HOT MOLDED

Effect of Time of Molding

Beating Medium	Molding Time, hrs.	M.R., kg./cm.²	M.E., kg./cm.²	T.S., kg./cm.²	Board Quality
1% NaOH 48 hours	1 hr. at 200° (mold preheated to 200°)	1006	93,100	801	warped
	2 hrs. at 200° (mold preheated to 200°)	1077	101,800	960	sound and flat
2% NaOH 50 hours	raised to 200° during 3 hours	1226	116,500	1198	slight internal checking
Water 48 hours	150° for 2 hours 200° for 1 hour	709	75,750	629	slight blistering

Molding pressure 1500 p.s.i.
Molding temperature 200° C.

TABLE VI.—VARIATION OF STRENGTH WITH DEGREE OF GELATINIZATION AND SPECIES

Sawdust Used	Degree of Gelatinization (% water retained)	Strength: Mean of Sound Samples M.R., kg./cm.²	Mean of Sound Samples M.E., kg./cm.²	Mean of Sound Samples T.S., kg./cm.²	Maximum Values Obtained M.R., kg./cm.²	Maximum Values Obtained M.E., kg./cm.²	Maximum Values Obtained T.S., kg./cm.²
White pine	30.1	714	75,700	629	774	82,500	722
	33.0	771	75,300	696	792	81,000	703
	37.0	1105	89,600	818	1340	93,200	930
	39.7	1170	123,100	1010	1365	150,500	1340
Redwood	33.5	1227	116,500	1197	1230	119,000	1200

Higher temperatures and pressures caused blistering and checking in the boards while lower temperatures or shorter periods of time gave incomplete drying which resulted in warped boards, (*see* Table IV). The rate of heating appeared to be a factor influencing the quality of the product. Best heating conditions appeared to be for two hours in a mold preheated to 200°C. (Table V). The indications are that a curing period (kiln) after hot pressing is beneficial in preventing subsequnt warping of the molded product.

Inherent Factors Influencing Strength

Under optimum molding conditions it was found that the strength of the boards produced from gelatinized sawdust depended upon the degree of gelatinization of the material (Table VI). This factor has been shown to depend upon the conditions of beating. The strength also appears to depend upon the species of wood used.

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An Instrument for Measuring the Liquid Permeability of Paper and Porous Materials*

By William H. Lane[1]

Abstract

An instrument is described which is capable of measuring the oil permeability of paper over a wide range of permeabilities.

Instruments have long been available for measuring the air permeability of paper and the rate of penetration of liquids into an originally unpermeated sheet. However, there has been no method for measuring the steady rate of flow of liquids through completely permeated paper under an external pressure differential and, therefore, for measuring the liquid permeability of paper analogous to the commonly measured air permeability.

Preliminary oil permeability experiments of an exploratory nature revealed that papers such as newsprint, mimeo, bond, etc. had permeabilities of such magnitude that, using castor oil and a sample area of about 7 sq. in., the amount of oil passing through the sheet per minute was of the order of 1 ml., even for driving pressures as low as 10 to 15 p. s. i. Accordingly, an instrument was designed and constructed which was capable of measuring permeabilities in this range.

The Darcy equation, $U/t = \mu PA/\eta L$, appears to be basic for calculating the oil permeability of paper; U is the volume of oil which flows through the sample in time t, P is the pressure differential across the sample, A is the tested area of the sample, L is the thickness of the sample, η is the viscosity of the oil, and μ is the permeability of the sample. The instrument was designed to measure permeabilities on the basis of this equation.

In Fig. 1 a sectional view of the oil permeability instrument is shown. The specimen for the oil permeability test is sandwiched between two pieces of ¾-inch boiler plate, which are held together by four ½-inch studs located at the corners of a square concentric with the test area. The lower plate is perforated by a circular array of 0.076-inch holes, with ¼-inch spacing between centers. A 200-mesh screen lies on the surface of this plate and serves to support the sample. The upper half of the instrument has two concentric circular rims near its outer edge which bear directly on the sample. These rims are 1/16-inch wide and project 1/16 inch below the lower surface of the plate. From the dimensions shown in Fig. 1, it is seen that the area of the sample subjected to test is 3 inches in diameter and that it is surrounded by an annular "guard-ring" area having a width of ⅝ inch. Into the top plate there is sealed a glass capillary (the inside diameter of which is approximately 1.5 mm.), whose lower end is flanged so as to bear against the tapered shoulders of the hole in the top plate. The capillary has four small bulbs blown in it. The upper one serves as a reservoir for the oil. The volumes indicated have the approximate values of: No. 1 = 0.05 ml., No. 2 = 0.25 ml., No. 3 = 1.0 ml., and No. 4 = 4.0 ml. Oil is admitted from the oil supply to both the guard-ring and the test areas by the two openings shown near the right edge in Fig. 1. These connections, as well as those leading to the nitrogen cylinder, are made with ⅛-inch standard steel pipe. The pressure gage is a 0 to 100-pound "test gage." A thermometer well (not shown in Fig. 1) is so located in the top plate that a —5 to 50° C. thermometer, graduated in tenths of a degree, may extend for some 3 to 4 inches laterally into the plate.

By applying the same pressure to the oil above the guard-ring area as is applied to the oil above the test area, there is no pressure differential tending to drive the oil laterally in the sheet between the test area and the guard-ring area of the sample. In this way, edge effects are eliminated and lateral flow of oil is avoided.

The instrument can be tested for leakage by replacing the sample with a piece of heavy sheet rubber and applying a large pressure. Lack of motion of the meniscus of the oil in the capillary shows the absence of leaks.

With no sample in place and for a rate of oil flow much greater than was ever used in an actual test, the pressure drop across the 200-mesh screen was found to be negligible.

The pressure gage used on the oil permeability instrument was calibrated at frequent intervals on a dead weight tester and the necessary corrections applied to all gage readings.

In making permeability measurements, one must

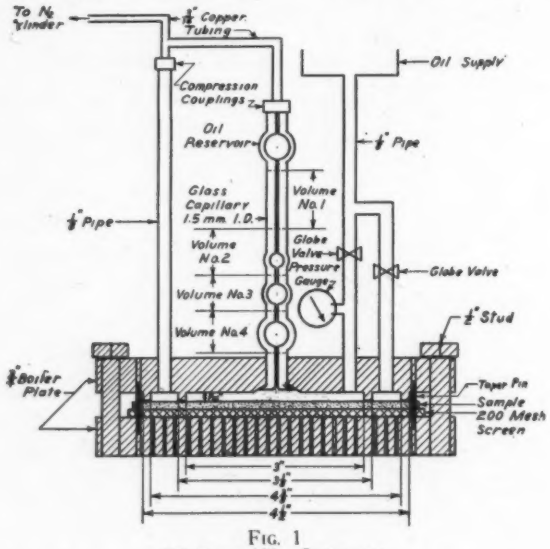

FIG. 1
Oil Permeability Instrument

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Hotel Commodore, New York, N. Y., Feb. 15-18, 1943.

A portion of a thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wis., 1942. This work was carried out under the direction of George R. Sears.

[1] Member TAPPI; Chemical Engineer, Texas Division, Monsanto Chemical Co., Texas City, Texas.

know accurately the viscosity of the oil in question over the temperature range of the constant relative humidity room in which all calibration and testing work on paper samples is done.

Because the volume of oil delivered by any one of the capillary bulbs of the instrument varies considerably with the rate of efflux (as a result of the different amounts of oil remaining behind on the walls of the bulb), the instrument must be calibrated so that the volume delivered by the bulb is known for a wide range of rates of efflux. Calibration is accomplished by supporting the top half of the instrument on two short pieces of 2 by 4 and allowing the oil to flow out of the capillary onto a weighed cloth. From the increase in weight of the cloth and the density of the oil, it is possible to calculate the volume delivered. Different rates of efflux are obtained by applying a slight pressure from the nitrogen cylinder. The instrument was first calibrated with castor oil and subsequently with a mineral oil (Valvoline SAE 50). The data represented graphically in Fig. 2 are for Valvoline SAE 50 and for that bulb of the capillary marked "Volume No. 3" in Fig. 1. It was found that the other three volumes were unnecessary.

For a sample of unknown permeability, rough measurements must first be made to establish the permeability range. From these it is possible to decide whether the oil permeability measurements can be made on a single sheet, or whether a specimen consisting of several sheets in series must be used to secure an accurately measurable pressure drop in the instrument. If a composite sample of several sheets in series is to be used, the edges of the pad should be sealed with molten wax for a short distance into the guard-ring area to prevent edge leakage.

The caliper or thickness measurements were made with the Federal compressibility gage *(1)*. In calculating oil permeabilities, that value of the caliper must be used which is obtained at the pressure employed in the oil permeability measurement.

Prior to making the oil permeability measurements, both halves of the instrument, as well as the 200-mesh screen, are blotted dry of oil. This prevents the possibility of any oil penetrating the sample from the bottom side. The sample is then placed on top of the 200-mesh screen. The top half of the instrument is put in place and quickly bolted down. Oil is admitted from the oil supply, the desired pressure applied by adjusting the flow of nitrogen from the cylinder, and measurements begun at once. If the sample is a single sheet, it is completely permeated by oil even before the first measurement can be completed. If the sample consists of several sheets in series, the sample is flushed several times at a high rate of oil flow to aid in removing the air. An oil permeability measurement is made by noting the time required for the amount of oil represented by Volume No. 3 to flow through the specimen. The volume in cc. is read from the calibration curve. The temperature of the upper half of the instrument, and of the oil within it, is read to the nearest 0.02° C. The viscosity of the oil can be read from the curves in Fig. 3. During a permeability determination, the pressure is recorded to the nearest 0.1 p. s. i.

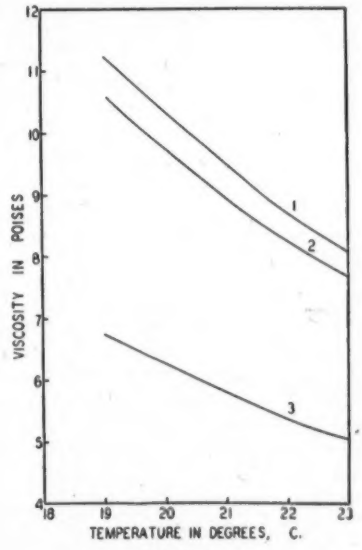

FIG. 2
Viscosity Curves
1, 2. Castor Oils. 3. Valvoline SAE-50

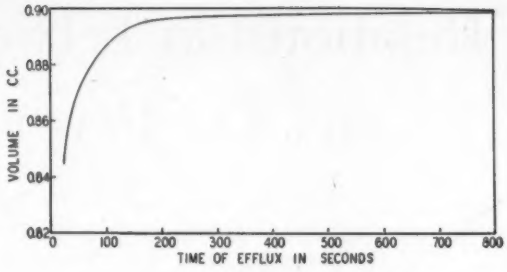

FIG. 3
Calibration Curve for Valvoline SAE-50

In making oil permeability measurements, the amount of oil forced through the sheet is roughly the same from one measurement to the next. Between measurements, the pressure from the nitrogen cylinder is released and the oil in the capillary bulb replenished from the oil supply. In flushing a sample, a volume of oil is forced through which is roughly equivalent to 2.5 times the amount used in an oil permeability measurement.

In the operation of the oil permeability instrument, sufficient clamping pressure is always used to cause the clamping ring which separates the guard-ring and test areas to emboss the sheet.

From a consideration of the factors involved, it may be stated that the oil permeability measurements are probably accurate to within 3%; the limiting factor is the accuracy of the pressure gage and depends to some extent upon the pressure at which the instrument is being operated. The range of measurable permeabilities is about 4000 fold. It is governed by three factors: the range of the pressure gage, which is from 5 to 100 p.s.i.; the range of sample thickness, which is from 1 to 20 sheets in series; and the range of the time of efflux, which is from 40 seconds up. By using oils of higher or lower viscosity and recalibrating the instrument this range may be considerably extended.

A subsequent paper will discuss the use of this instrument in studying the relationship between the air permeability and oil permeability of paper.

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Relationship between Air Permeability and Oil Permeability of Paper*

By William H. Lane[1]

Abstract

The oil permeability of many papers is not a constant but decreases as the oil flows through the sheet. The more permeable sheets show little or none of this effect, and the oil permeability is essentially constant. Air permeability appears to be a true constant.

The oil permeabilities of the papers studied were less than their air permeabilities; the smallest ratio of air to oil permeability was 1.37. A possible explanation of this observation is the shearing of molecular aggregates in the oil as it flows through the fine capillary spaces of the sheet, causing the effective viscosity of the oil to be greater than the normal viscosity and consequently causing the calculated oil permeability to be less than the true value.

The lack of constancy in the ratio of air to oil permeability indicates that the air permeability, although a characteristic constant of the sheet, cannot in general be used as an index of oil permeability.

The data obtained show that the logarithm of air or oil permeability is essentially proportional to the freeness of the stock. This relationship can hold only when freeness is the sole variable.

The permeability of sheets filled with English coating clay or calcium carbonate was found to increase with increasing filler content. The effect of calcium carbonate was considerably greater than that of clay.

The permeability of handsheets increased as the amount of rosin size was increased, but there was no clearly defined relationship. No trend was noted for sheets containing starch size.

This investigation was undertaken in the hope that it might illuminate some of the many interesting conjectures regarding the mechanism of the flow of printing ink into paper during the printing process. When this flow into the sheet takes place under high pressures, the wettability of the sheet is not an important variable. Under this condition, the rate of penetration of oils and ink vehicles into paper should be determined by the pore sizes and their distribution in the sheet, the viscosity and surface tension of the liquid, and the pressure difference driving the oil or vehicle into the sheet. Therefore, the ranking of a group of papers by the rates of oil penetration should be the same as the ranking by the rates of air penetration.

Because of the instability of inks and the difficulties of reproducing their rheological properties, tests of ink penetration into paper are commonly carried out indirectly by using an oil. These tests diverge from actual printing conditions, in that the oil penetrates an uncompressed sheet of paper under capillary forces alone. It is conceivable, if not probable, that the ranking of a group of papers with regard to the rate of oil penetration may be quite different when the penetration takes place as a result of large external driving pressures rather than because of capillary forces alone.

As mentioned above, correlation between air permeability and oil permeability may be expected if the wettability of the sheet by the oil is not a variable. Such a correlation has been suggested on several occasions, but has been neither substantiated nor disproved [see, for example, Shaw and Simmons (1)]. In many respects, the study of air permeability is simpler and more convenient than the study of oil permeability. Therefore, a satisfactory settlement of the validity of the correlation between air permeability and oil permeability would constitute a definite gain in the general study of printability.

Experimental Procedure

A description of the instrument which was designed and contructed during the course of this investigation for the measurement of the oil permeability of paper is given in a previous publication *(2)*.

It is not necessary to give a detailed description of the air permeability instrument, as it was modeled rather closely after that described by Carson *(3-5)*. The test area defined by the permeability cell was 3 inches in diameter, and it was surrounded by an annular guard ring $\frac{5}{8}$ inch in width. Calibration of the four capillary-tube flowmeters was carried out by application of the aspirator bottle principle used by Carson in the calibration of his smallest capillary; however, a nonvolatile oil was used in the aspirator bottle instead of water. Temperature and pressure corrections were applied to give the true volume under conditions prevailing on the entrance side of the capillary. The capillary constant is $C = \phi/\rho HS$, where ϕ is the volume rate of flow under conditions prevailing on the entrance side of the capillary in cc. per sec., ρ is the density of the kerosene (0.811 gram per cc.) used in the manometers, H is the manometer reading in cm., and S is the area of the test cell (45.60 sq. cm.). The units of C are cc. per gram per sec. In the calibration curves of Fig. 1, C versus H is plotted. The four capillaries were designated C-1, C-2, C-3, and C-4. Capillary C-3 was also calibrated using water in the aspirator bottle; these data are shown as "C-3(H_2O)." The error incurred by using water in the aspirator bottle, without applying a correction for the change in volume of the air as it passes from the atmosphere of the room (all calibration and testing work was done in a constant temperature and humidity room at 65% R. H. and 70° F.) through the capillary into the aspirator bottle, is seen (by comparing this curve with that marked "C-3") to be about 1%. This is in excellent agreement with the calculated increase in volume of

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A portion of a thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wis., 1942. This work was carried out under the direction of George R. Sears.

[1] Member TAPPI; Chemical Engineer, Texas Division, Monsanto Chemical Co., Texas City, Texas.

air when its degree of saturation changes from 65% to 100%.

The oil permeability instrument had a test area and guard-ring area identical with that of the air permeability instrument. Both the air and the oil permeability instruments were equipped with two taper pins which had exactly the same spatial relationship to the test area in each instrument. This assured the testing of exactly the same specimen areas in the two instruments, as the specimens were punched to fit the taper pins prior to testing.

The Darcy equation, $U/t = (\mu AP)/(\eta L)$, was used for calculating the oil and air permeabilities of paper. In this equation, U is the volume of the fluid of viscosity η flowing in time t through the area A of the permeable medium having a thickness L and a permeability μ under the pressure differential P. This leads to the following equation for calculating the oil permeability from data obtained with the oil μ_o (sq. cm) = [U (cc.)/t (sec.) × ξ (poises) × L (thickness in in.)/P (p. s. i.)] × (8.0.8 × 10^{-7}).

The corresponding working equation for calculating the air permeability is: μ_a(sq. cm.) = [H(cm.)/h(cm.)] × [1-h(cm.)/2484] × [η(poises)] × C(cc./g./sec.) × L(thickness in inches) × 0.00259. In this equation, h is the pressure differential across the sample in cm. of kerosene; the other terms have been defined above.

The term (1-h/2484) is employed to change the volume rate of flow from that corresponding to the pressure prevailing on the entrance side of the capillary to that for the algebraic mean pressure in the flow channel. An explanation of this is given by Muskat (*6*, page 78).

The caliper measurements were made with the Federal compressibility gage *(7)*. The caliper should be measured at the same pressure as that used in the oil permeability measurement.

For a sample of unknown permeability, rough measurements must first be made to establish the permeability range. From these it is possible to decide whether the oil permeability measurements can be made on a single sheet, or whether it is necessary to use a pad of several sheets in order to secure a sufficient pressure drop in the oil permeability instrument. If a composite sample of several sheets in series is to be used, the edges of the pad are sealed with molten wax for a short distance into the guard-ring area. This procedure was found to be effective in both the air and oil permeability measurements for preventing edge leakage or lateral flow between the test and guard-ring areas in those cases in which more than one sheet was used.

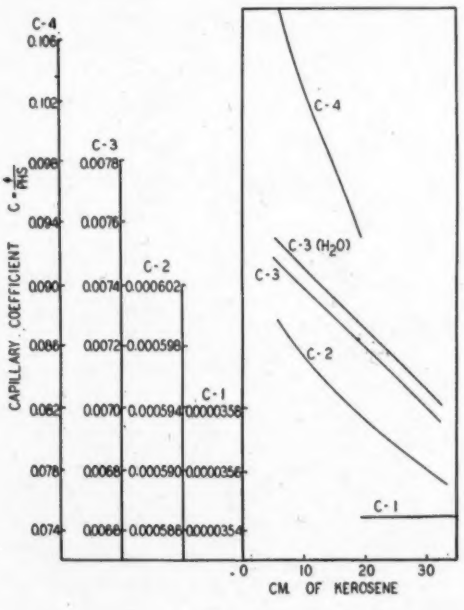

FIG. 1
Calibration Curves for Air Permeability Instrument

Following the decision regarding the number of sheets to be used as a test specimen, the specimen was prepared, punched, and placed in the air permeability instrument. The technique of operating the instrument is that described by Carson *(3)*. The same specimen was then placed in the oil permeability instrument and the oil permeability determined.

In the operation of both the air and oil permeability instruments, sufficient clamping pressure was always used to cause the ring which separates the guard-ring and test areas to emboss the sheet.

The handsheets used in this investigation were prepared in accordance with TAPPI Standard T 200 m-40, except that they were pressed and dried between Whatman's No. 1 filter papers so as to give the same surface to both sides of the sheet and thus avoid the glazed effect produced on one side of the sheet when prepared with the British equipment.

Discussion of Results

It was noted immediately at the beginning of this work that the oil permeability was not equal to the air permeability. For many samples, the ratio of air to oil permeability ranged from 1.4 to 1.7; the oil permeability was always less than the air permeability, a phenomenon which will be considered later in this discussion. Table I lists typical values of air and oil permeabilities, as well as their ratios.

It was also found that, except for the most permeable specimens, the oil permeability steadily decreased as oil was forced through the specimen. Approximately 0.9 cc. of oil was forced through the specimen in making a single determination of the oil permeability. If the small oil reservoir was then refilled and another determination made, the second value of the permeability was smaller than the first. Likewise, each succeeding determination yielded a smaller value of the permeability, within the experimental error of about 3%. The permeability decreased more rapidly for specimens of lower initial permeability. For example, the initial value of the oil permeability for a specimen of well-beaten sulphite pulp was 4.79 × 10^{-12} sq. cm.; after 6 flushings with oil and 6 oil permeability measurements, the value was 1.69 × 10^{-12} sq. cm. The initial permeability of a specimen made from the same pulp, only lightly beaten, was 1.23 × 10^{-9} sq. cm.; after 7 measurements, the value was still 1.23 × 10^{-9} sq. cm. This continual decrease in oil permeability is in sharp contrast to the constancy of the air permeability, in which no change was found over long periods of continuous flushing with air.

Speculation regarding the cause of this decrease in oil permeability originally proceeded along four lines. One hypothesis was that it was the result of the oxidation of the oil and the consequent plugging of the pores in the sheet by the absorption or filtra-

tion of highly viscous components of the oil. A second hypothesis was that the decrease was caused by the filtration or adsorption of large molecular weight fractions of the oil, or of traces of dispersed material, and the consequent plugging of the pores of the sheet; this hypothesis differed from the first in that the filtered or adsorbed material was not formed by the oxidation of the oil but was originally in the oil. A third hypothesis was based on the possibility of the pores in the sheet being reduced in effective size by the orientation or breakage of the fine fibrils which project from the fiber surfaces into the pores or capillary spaces between the fibers. These fibrils might slowly orient under the shearing stresses of the flowing oil, as do weeds in a stream, thereby reducing the effective size of the capillary spaces and consequently reducing the permeability of the specimen. If the shearing stresses are great, some of the fibrils may be torn from the parent fiber and move with the oil stream until they are caught in a constriction; gradual plugging of the sheet might thus occur. The fourth hypothesis was the suggestion that an electrical difference of potential might be built up between the upper and lower surfaces of the specimen as a result of the flow of oil through the sheet and that this streaming potential might retard the rate of flow and so reduce the permeability.

The hypothesis of the oxidation of the oil was examined in the following way: The oil first used was castor oil. It was thought that a mineral oil would oxidize less readily and, hence, show a less rapid decrease in permeability. A heavy mineral oil (Valvoline SAE 50) was used, but the permeability of well-beaten sheets still decreased, as before. The refractive index of the oil was measured before and after it had passed through the sheet, and the two values differed by less than 0.0001. Another series of tests was run, using a mineral oil (BAYOJ) from which the unsaturated portion had been removed during the refining process. This oil had a much lower viscosity than either the castor oil or the first mineral oil and, for specimens of any given permeability, the rate of decrease in permeability was less for this oil permeabilities with the more viscous oils, it was found that the rate of decrease of permeability to this oil was as great as that of less dense sheets to the heavier oils. It thus seems unlikely that oxidaspecially refined oil. However, for specimens which were too dense to allow the determination of their tion plays an important role in the observed reduction of the permeability with the continued flow of oil through the specimen.

The hypothesis involving the adsorption or filtration of high molecular weight fractions of the oil or of dispersed material in the oil was investigated as follows: A sample of the heavy mineral oil (Valvoline SAE 50) was treated in a cyclic molecular still at progressively higher temperatures until approximately half the original sample had distilled. Care was exercised in the distillation and in the subsequent handling of the distillate to keep all vessels clean and free of dust. Permeabilities determined with this oil were found to decrease essentially as they did for the undistilled oils. It thus appeared improbable that dispersed solid material was contributing to the plugging of the sheet. Another test was made by measuring the air permeabilities of three similar sheets, placing the sheets as a pad in the oil permeability instrument, allowing the oil to flow until the permeability had decreased from 3.81 to 2.99 $\times^{-11}$ sq. cm., and then removing the pad and measuring the oil permeabilities of the individual sheets. The ratio of the air to the oil permeabilities of the top, middle, and bottom sheets did not differ by more than the experimental error of the oil permeability measurement. If the sheets were filtering material from the oil, the top sheet should have been plugged more than the other two and the ratio of air to oil permeability of that sheet should have been definitely greater than that of the other two.

The tests intended to illuminate the hypothesis that orientation or breakage of fibrils contributed to the decrease in permeability are also of interest in connection with the preceding discussion of filtration effects. A well-beaten sheet of bleached sulphite was tested. The initial value of its oil permeability was 4.79×10^{-12} sq. cm.; after 20 oil permeability measurements and 6 flushings with oil, the value was

TABLE I

Sample	Basis Weight (25x40-500) lb.	Caliper, in.	S.-R. Freeness, cc.	Filler, %	Size, %	Burst, pt./lb.	Tear Factor	Gurley Porosity, sec.	μ_a sq. cm.	μ_o sq. cm.	μ_a/μ_o sq. cm.
Mimeo paper	...	0.0042	...	..	..	....	...	...	1.94×10^{-10}	1.41×10^{-10}	1.37
Bond paper	...	0.0039	...	..	..	....	...	...	5.11×10^{-11}	3.02×10^{-11}	1.69
Filter paper	...	0.0048	...	..	..	....	...	...	1.81×10^{-10}	1.23×10^{-10}	1.47
West Coast	47.3	0.0048	810	0	0	0.376	2.76	1.9	1.34×10^{-9}	0.92×10^{-9}	1.46
bleached sulphite	49.3	0.0043	670	0	0	0.682	1.84	17.2	1.26×10^{-10}	0.83×10^{-10}	1.52
handsheets	48.1	0.0042	460	0	0	0.798	1.46	94.6	2.20×10^{-11}	1.38×10^{-11}	1.59
	47.4	0.0035	310	0	0	0.832	1.16	260	2.10×10^{-12}	1.20×10^{-12}	1.75
	...	0.0033	200	0	0	....	...	...	4.81×10^{-12}	1.86×10^{-12}	2.58
Hardwood	44.2	0.0056	705	0	0	0.170	0.560	3.8	9.10×10^{-10}	6.17×10^{-10}	1.47
bleached kraft	44.3	0.0051	620	0	0	0.212	0.531	6.9	4.52×10^{-10}	3.10×10^{-10}	1.46
handsheets	44.7	0.0047	440	0	0	0.248	0.447	15.6	1.80×10^{-10}	1.17×10^{-10}	1.54
	42.4	0.0046	350	0	0	0.274	0.441	28.9	9.66×10^{-11}	5.84×10^{-11}	1.65
	44.6	0.0045	230	0	0	0.296	0.419	57.3	4.22×10^{-11}	2.40×10^{-11}	1.76
West Coast	47.6	0.0042	450	0	0	0.867	1.54	101	2.03×10^{-11}	1.24×10^{-11}	1.63
bleached sulphite	48.6	0.0040	450	2.1	0	0.845	1.52	74	2.21×10^{-11}	1.31×10^{-11}	1.69
handsheets filled	50.4	0.0042	450	5.8	0	0.712	1.55	57	3.62×10^{-11}	2.28×10^{-11}	1.59
with English	58.0	0.0047	450	21.8	0	0.505	1.47	58	3.97×10^{-11}	2.38×10^{-11}	1.67
coating clay	88.2	0.0063	450	85.3	0	0.172	0.83	62	5.99×10^{-11}	3.21×10^{-11}	1.86
West Coast	45.7	0.0039	390	0	0	0.817	1.21	164	9.31×10^{-12}	5.81×10^{-12}	1.60
bleached sulphite	48.3	0.0040	390	5.7	0	0.786	1.23	145	10.8×10^{-12}	7.22×10^{-12}	1.50
handsheets filled	50.5	0.0041	390	10.5	0	0.765	1.27	127	1.77×10^{-11}	1.10×10^{-11}	1.61
with calcium	60.4	0.0051	390	32.2	0	0.546	1.20	53	4.73×10^{-11}	2.94×10^{-11}	1.61
carbonate	133.9	0.0098	390	193	0	0.110	0.64	12.6	4.20×10^{-10}	2.59×10^{-10}	1.62
West Coast	47.6	0.0040	450	0	0	0.817	1.40	86	2.14×10^{-11}	1.34×10^{-11}	1.60
bleached sulphite	50.6	0.0042	450	0	0	0.713	1.46	78	2.40×10^{-11}	1.56×10^{-11}	1.54
handsheets sized	51.1	0.0040	450	0	2	0.729	1.46	67	2.54×10^{-11}	1.69×10^{-11}	1.50
with rosin (30%	51.3	0.0042	450	0	4	0.644	1.44	48	3.55×10^{-11}	2.31×10^{-11}	1.54
free rosin)											
West Coast	46.7	0.0039	400	0	0	0.800	1.31	140	8.99×10^{-12}	5.08×10^{-12}	1.77
bleached sulphite	49.1	0.0040	400	0	2	1.01	1.16	183	7.08×10^{-12}	4.00×10^{-12}	1.77
handsheets sized	50.0	0.0042	400	0	4	1.06	1.09	153	10.2×10^{-12}	6.45×10^{-12}	1.58
with starch	52.0	0.0042	400	0	8	1.04	0.966	152	8.60×10^{-12}	5.64×10^{-12}	1.52

1.74×10^{-12} sq. cm. The specimen was inverted in the tester, and the initial value for the reversed direction of oil flow was 3.93×10^{-12} sq. cb.; after 7 measurements and 1 flushing with oil, the value was 1.99×10^{-12} sq. cm. The specimen was again inverted; the initial value was 3.40×10^{-12} sq. cm.; after 4 measurements the value was 3.17×10^{-12} sq. cm. The specimen was washed with petroleum ether by gently laying it in a crystallizing dish holding 20 cc. of the solvent, removing it to another dish of fresh solvent, and repeating this operation until the specimen had been washed six times. After drying, the air permeability was found to be 7.60×10^{-12} sq. cm. as compared with the original value of 7.92×10^{-12} sq. cm.; the oil permeability was 4.71×10^{-12} sq. cm. Thus, the gentle washing with petroleum ether removed the "plugging" material and returned the oil permeability to its original value and the air permeability to within 4% of its original value. It seems unlikely that fibrillar debris caused the plugging of the sheet, because it would not be expected that the gentle washing with petroleum ether would so completely remove the debris from the fine capillary spaces of the sheet. These results leave the orientation of the fibrils still attached to their parent fibers as a possible explanation of the gradual plugging of the sheet as the oil flows through it. A reversal of the direction of oil flow would temporarily reduce the orientation of the fibrils and cause a partial recovery of the oil permeability, followed by the decrease in permeability as orientation in the new direction became more complete. Washing with an oil solvent would cause essentially complete recovery of the original oil permeability by removing the viscous oil which holds the fibrils in their oriented positions. If orientation were the entire explanation of the apparent plugging effect, the oil permeability should fall to an equilibrium value if the oil flow were maintained for a sufficiently long period

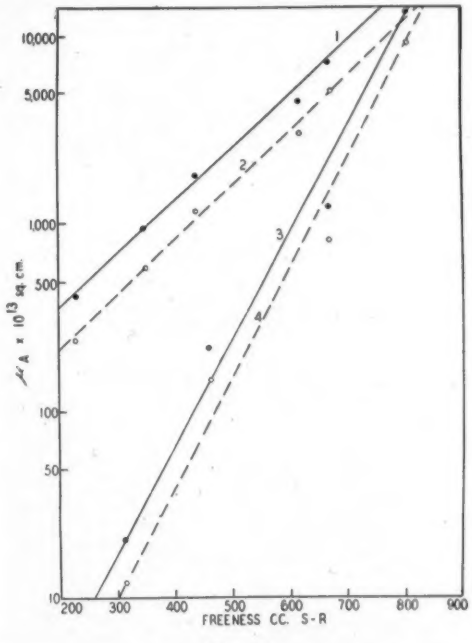

FIG. 2

Relation of Pulp Freeness to Air Permeability. 1, 2. Hardwood Bleached Kraft: Air and Oil. 3, 4. Bleached Sulphite: Air and Oil

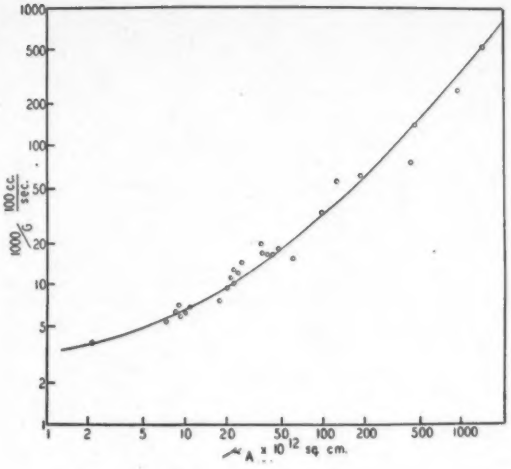

FIG. 3

Relation of Air Permeability to Gurley Porosity

of time. However, there was little, if any, indication that such an equilibrium value was being reached, even after 25 flushings with oil. There was a further objection to the hypothesis of orientation, in that the oil permeability appeared to change less rapidly at high than at low driving pressures.

It seemed that the contribution of streaming potentials to the decrease in oil permeability must be small because of the observation that if, after flushing several times, a specimen were left in the instrument with no driving pressure applied or if the specimen were removed from the instrument overnight and then replaced, the oil permeability did not recover its original value but continued its downward course as if there had been no interruption in the series of repeated flushings with oil. It does not appear likely that an electrical potential difference would have remained constant during such an interruption of the flow of oil. Also, a reversal of the direction of oil flow should have caused a temporarily complete recovery of the original permeability.

Thus, there seems to be no satisfactory explanation for the observed decrease in oil permeability as oil is repeatedly forced through the specimens.

In calculating all ratios of air to oil permeability, the initial and, therefore, the greatest value of oil permeability was used.

That Darcy's equation satisfactorily describes the flow of oil through paper is shown by the fact that, within the experimental error, the oil permeabilities determined at different driving pressures are the same. Table II shows values of oil permeability at five pressures ranging from 5.7 to 40 p.s.i.

Similarly, Table III indicates that the air permeabilities determined at different driving pressures, h, are constant within the experimental error and, hence, that the Darcy equation also satisfactorily describes the flow of air through paper under the conditions used in this work.

The change in both the air and oil permeabilities with a variation in the density of the sheet is illustrated in Table I by the two series of handsheets in which the degree of beating was varied. Figure 2 shows that the logarithm of the permeability is essentially proportional to the freeness of the stock from which the sheets were made. This relationship holds only for a given pulp and for sheets

TABLE II

Pressure p.s.i.	$\mu_o \times 10^{10}$ sq. cm.
5.7	1.26
9.0	1.26
14.0	1.25
19.0	1.25
40.0	1.23

TABLE III

h cm. of kerosene	$\mu_a \times 10^{10}$ sq. cm.
2.00	9.13
4.01	9.08
6.07	9.15
8.09	9.11
10.10	9.10
12.07	9.10

formed, pressed, and dried under similar conditions —i. e., only when freeness is the sole variable.

The data in Table I for the two series of handsheets with varying filler content show that the permeabilities increase with the amount of filler. The relationship is not sufficiently regular to warrant the presentation of a graph. It is evident that the calcium carbonate was much more effective than the coating clay in opening up the sheet structure.

Likewise, the data of Table I show that both permeabilities increased with increasing amounts of rosin size in the sheet. There was no definite relationship between the permeability and amount of starch.

Within each group of handsheets, except that in which the amount of starch size was varied, the ranking of the samples was the same according to both permeabilities. However, the unexplained decrease in the oil permeability with continued flow of oil and the lack of constancy in the ratio of air to oil permeability indicate that air permeability cannot, in general, be accepted as a reliable index of oil permeability.

The failure of the ratio of air to oil permeability to approximate unity is surprising. The only data found in the liaterature for permeability measurements on the same sample with both liquids and gases are those given by Muskat *(6)*. Those data indicate excellent agreement between the air and liquid permeabilities. However, the permeabilities of the sandstones reported by Muskat were of the order of 1.5×10^{-6} sq. cm., or about 1,000 times those of the most permeable sheets examined in the present work. The observed fact that the oil permeabilities of paper are lower than the air permeabilities stimulates speculation regarding the possibility that molecular aggregation in the oils may account for the phenomenon. There may be molecular groups in the oils which are not sheared and broken down during flow in ordinary viscosity determinations, but which are sheared by flow through the fine pores and capillary spaces of paper. The energy loss consequent to such a shearing action in flow through paper would cause an increase in the effective viscosity of the oils and thereby yield too low a permeability, as the permeability is calculated from the Darcy equation by using the ordinary viscosity.

The testing of the samples used in this study afforded a good opportunity to compare air permeabilities measured with the Carson instrument and with the Gurley densometer. Table I lists both values, and Figure 3 shows their relationship graphically. The reciprocal of the Gurley densometer reading is multiplied by 1,000 and plotted against the air permeability (multiplied by 10^{12}) obtained with the Carson instrument. It has been suggested by other workers that the Gurley instrument gives spuriously low values for relatively impermeable specimens because of the leakage of air through the seal. The guard ring of the Carson instrument prevents this type of leakage. Figure 3 shows that the Gurley values tend to be low as compared with the air permeability measured with the other instrument.

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Heat Utilization in Sulphate Mills*

By Harold T. Baker[1]

Abstract

This study of heat utilization in the sulphate process includes engineering data of 14 plants on the heat reclaimed, with particular emphasis on the use of flash steam from the digester blow to heat hot water for pulp washing.

The particular heat utilization investigated was the use of flash steam from the digester blow to heat hot water for use in washing the pulp. There have been some previous preliminary investigations. In the 1933 TAPPI Special Report 200, one question dealt with heat recovery from blow flash steam and seven out of twelve mills reported no heat recovered. In 1936 the TAPPI Special Report 243 gives an analysis of possible heat recovered, but no actual results of mill operations were given.

In *Technical Association Papers,* Series 24, there is an excellent article by Hunt and Miller analyzing blowdown heat recovery systems; this includes diagrams, methods of operation and calculations of possible results. Reference is made to this paper for systems in use.

Survey of Mills

Accordingly a report on the actual results being obtained by mills using the heat available in the digester blow flash steam was considered desirable and is the subject of this paper.

For this report, a form asked for the basic data,

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The survey was made by the TAPPI Staff for the Heat Utilization in Chemical Processes Subcommittee under Project No. 202 of the Engineering Division. The data were developed as TAPPI Special Report 329.

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namely the production in tons per day, the wood used and its moisture content, the amount of liquor used, and the pressure at time of blow. Information was requested as to the type of heat recovery equipment installed and the mills' figures on heat recovered per ton of pulp produced. The survey form is given in Form I.

Basis of Calculations

A simplified computation was then prepared making use of various assumptions, to estimate what heat could be recovered, using the basic data reported by the mills. One assumption necessary was that of the weight of moisture-free wood in a cord of chips or the percentage of yield of pulp to get the dry weight of wood used.

The heat available comes from the flash steam from the materials in the digester at the time of blow. These are converted to water equivalents, using their specific heat coefficients and densities. It is assumed that the liquor can be considered the same as water, its higher specific gravity being offset by its lower specific heat coefficient.

Heat Recovery

As shown in Table I, the water equivalents of the digester charge are computed, based on one ton of pulp. The flash steam from pressure at time of blow

TABLE I.—HEAT UTILIZATION IN SULPHATE MILLS—USE OF DIGESTER-BLOW FLASH STEAM

Description	Mill 1	Mill 2	Mill 3	Mill 4	Mill 5
Digesters	4	2	2 at 2200 CF	6	6
Blows per day	24	14—15	17	21	36
Pulp per day, tons	350	100	102	200	302.4
Chip charge per blow, cords	22	12.88	10	16.2	11.3(lg.)
Moisture, %	50	30	52	50	50-52
Liquor charge, gal.	12,000	12,375	6,000	7,290(0)	11,270
Pressure (start of blow), p.s.i.	110	100	110	105	110
Heat recovery	Jet Cond. H.E. Liquid to Water	None	Jet Cond. H.E. Vapor to Water	Surf. Cond.	Jet Cond. H.E. Liquid to Water
Heat recovered, B.t.u./ton	Not Given	.....	2,117,700	Not given	2,350,000
Water heated from-to, °F	80°—149°	.....	70°—150°	No data	37°—150°
Water heated (computed), gal./ton	Not given	.....	3,170	.....	2,500
COMPUTATIONS					
Cords per ton pulp, cords	1.51	1.87	1.67	1.70	1.35(lg.) 1.69(std.)
Dry weight wood, lb./ton	4,050	5,050	4,520	4,580	4,570
Water in wood, lb./ton	4,050	2,160	4,900	4,580	4,750
Yield of pulp (computed), %	49.2	40	44	43.5	44
Liquor per ton, gal.	820	1,790	1,000	765	1,340
WATER EQUIVALENTS PER TON					
Wood at .33 sp. ht., lb.	1,340	1,660	1,490	1,390	1,510
Water at 1.00 sp. ht., lb.	4,050	2,160	4,900	4,580	4,700
Liquor (gal. x 8.33 x 1.0) S.H., lb.	6,830	14,900	8,330	6,370	10,170
Total Equivalents, lb.	12,220	18,720	14,720	12,340	16,380
Flash steam, lb./lb. w.e.	.140	.132	.140	.136	.140
100% Flash steam, lb./ton	1,710	2,470	2,060	1,675	2,290
Deduct 10% for losses, lb.	171	247	206	162	229
Available for heating water, lb./ton	1,539	2,223	1,854	1,508	2,061
Heat in flash steam atm., B.t.u./lb.	1,150	.....	.....	.....	1,143
Heat in condensate at 160°, B.t.u./lb.	128	.....	.....	.....	128
Heat available, B.t.u./lb.	1,022	.....	.....	.....	1,015
Total heat available, B.t.u./ton	1,570,000	2,370,000	1,890,000	1,540,000	2,110,000

Description	Mill 6 (Soda)	Mill 7	Mill 8	Mill 9	Mill 10
Digesters	5	4—2	4	4	5
Blows per day	24	24—12	36	25	24
Pulp per day, tons	151.2	210	288	270	225
Chip charge per blow, cords	12.5(lg.)	12—7	13.5	17	19.8
Moisture, %	65	50	48—51	47.5	50
Liquor charge, gal.	10,130	7800—4200	7,965	9,590	15,000
Pressure (start of blow), p.s.i.	110	100	100	105	110
Heat recovery	Jet Cond. H.E. Liquid to Water	Jet Cond. H.E. Vapor to Water	Surf. Cond.	Jet Cond. H.E. Vapor to Water	Jet Cond. H.E. Vapor to Water
Heat recovered, B.t.u./ton	3,363,000	2,400,000	746,000	1,870,000 C.	1,265,000 C.
Water heated from-to, °F.	37°—150°	70°—135°	107°—127°	70°—130°	80°—150°
Water heated (computed), gal./ton	3,560	4,470 C.	4,500 C.	3,740 C.	
COMPUTATIONS				**	
Cords per ton pulp, cords	1.98(lg.) 2.48(std.)	1.76	1.69	1.57	2.11
Dry weight wood, lb./ton	5,560	4,780	4,550	4,250	5,000
Water in wood, lb./ton	10,310	4,780	4,460	3,840	5,000
Yield of pulp (computed), %	36(est.)	42	44	47	40
Liquor per ton, gal.	1,609	1,270	997	889	1,600
WATER EQUIVALENTS PER TON					
Wood at .33 sp. ht., lb.	1,830	1,570	1,500	1,410	1,650
Water at 1.00 sp. ht., lb.	10,310	4,780	4,460	3,840	5,000
Liquor (gal. x 8.33 x 1.0) S.H., lb.	13,400	10,570	8,320	7,400	13,320
Total Equivalents, lb.	25,540	16,920	14,280	12,650	19,970
Flash steam, lb./lb. w.e.	.140	.132	.132	.136	.139
100% Flash steam, lb./ton	3,570	2,235	1,885	1,720	2,780
Deduct 10% for losses, lb.	357	223	188	172	278
Available for heating water, lb./ton	3,213	2,012	1,697	1,548	2,502
Heat in flash steam atm., B.t.u./lb.	.....	1,150	.....	.....	.....
Heat in condensate at 160°, B.t.u./lb.	.....	128	.....	.....	.....
Heat available, B.t.u./lb.	1,015	1,022	1,022	1,022	1,022
Total heat available, B.t.u./ton	3,280,000	2,060,000	1,740,000	1,585,000	2,570,000

** System designed for 200 T.

Description	Mill 11	Mill 12	Mill 13	Mill 14
Digesters	7	4	8	4
Blows per day	42	22	40	36
Pulp per day, tons	400	250	240	120
Chip charge per blow, cords	17½	19.8	9.0	5.65
Moisture, %	50	50	48	52
Liquor charge, gal.	8,700	13,500	4,160	3,790
Pressure (start of blow), p.s.i.	100	100	110	110
Heat recovery	Jet Cond. H.E. Vapor to Water	Surface Condenser	None	Jet Cond. H.E. Liquid to Water
Heat recovered, B.t.u./ton	2,080,000	1,328,000	.....	1,807,275
Water heated from-to, °F.	40°—100°	70°—150°	.....	50.3—61.6
Water heated (computed), gal./ton	2,500	2,000	.....	1,925
COMPUTATIONS				
Cords per ton pulp, cords	1.83	1.74	1.50	1.69
Dry weight wood, lb./ton	4,950	4,700	4,050	4,570
Water in wood, lb./ton	4,950	4,700	3,740	4,950
Yield of pulp (computed), %	41	42.5	49.5	44.0
Liquor per ton, gal.	911	1,188	695	1,135
WATER EQUIVALENTS PER TON				
Wood at .33 sp. ht., lb.	1,630	1,550	1,335	1,510
Water at 1.00 sp. ht., lb.	4,950	4,700	3,740	4,950
Liquor (gal. x 8.33 x 1.0) S.H., lb.	7,600	9,880	5,710	9,460
Total Equivalents, lb.	14,180	16,130	10,785	15,920
Flash steam, lb./lb. w.e.	.132	.132	.140	.140
100% Flash steam, lb./ton	1,870	2,130	1,507	2,230
Deduct 10% for losses, lb.	187	213	151	223
Available for heating water, lb./ton	1,783	1,917	1,356	2,007
Heat in flash steam atm., B.t.u./lb.	1,150	.....	.....	.....
Heat in condensate at 160°, B.t.u./lb.	128	.....	.....	.....
Heat available, B.t.u./lb.	1,022	1,022	1,022	1,022
Total heat available, B.t.u./ton	1,715,000	1,960,000 Not all heat reclaimed	1,385,000	2,050,000

Basis of wood—100 cu. ft. solid wood per cord at 30-lb./cu. ft. moisture-free = 3000 dry wood per cord. Allowed 10% for bark and waste.

to atmosphere is computed in pounds per pound of water equivalent and in total pounds per ton of pulp. A 10% loss or safety factor is allowed, to give a net amount of flash steam for heating water in pounds per ton. The heat in the flash steam at atmospheric pressure is definite, but the temperature at which it is condensed is variable. For this computation, condensate temperature has been assumed at 160° F., as this temperature would probably not be exceeded.

A figure of total heat available in British thermal units per ton of pulp results from these computations to compare against the actual recovery from mill reports and against the type of equipment used.

The following comparisons are apparent from the data submitted:

1. All of the mills reporting, except one, had heat recovery equipment.

2. Most of the mills reporting use jet condensers for blow flash steam heat recovery, and of these the preference for heat exchangers seem to be for vapor to water heater.

3. Most of the mills using jet condensers are getting better heat utilization than the computations show, indicating that the losses for radiation and other reasons are not as large as assumed, or that heat can be reclaimed to a lower level than 160° F.

4. Only 3 out of 14 mills reporting have surface condensers.

5. The one mill reporting results on surface condenser operation indicates a much lower heat recovery than that available. This may be due to difficulty in keeping the tubes clean and the resultant low heat transfer through them.

6. The amount of heat available per ton is not a uniform constant quantity for all mills. The variation is mainly due to the difference in the quantities of liquors added to the chips per ton of pulp made.

Finally, the reports and computations show that there is an appreciable amount of heat available in the blow flash steam amounting to roughly 40% of the steam used in cooking the pulp.

FORM I.—HEAT RECOVERY FROM SULPHATE DIGESTERS

1. Number of digesters .....
2. Number of blows per day .....
3. Tons pulp produced per day .....
4. Total charge of chips per cook, cords .....
5. Moisture in chips, % .....
6. Total charge of liquor per cook, gallons .....
7. Pressure in digester at start of blow .....
8. Method of heat recovery from digester blow:
   a. No attempt made to recover heat .....
   b. Condensed by
      Surface condenser heating water directly .....
      Jet condenser and heating water indirectly .....
      1. By heat exchanger—hot liquid to heat water .....
      2. By heat exchanger—hot vapor to heat water .....
9. Heat recovery obtained on basis of
   a. Total B.t.u's. per day .....
   b. B.t.u's. per ton .....
   c. Gallons per day heater from ..... °F. to ..... °F.
   d. Gallons per minute heater from ..... °F. to ..... °F.

Additional Information

Mill 3. Foster-Wheeler heat recovery system was installed in this plant and the equipment proportioned for 14 blows and 15-minute blowing periods. In actual operation 16 and 17 blows are obtained and blowing periods are only 10 minutes long. Correspondingly, the recovery of heat from this installation is limited to the capacity of the two-stage flash heater (608 sq. ft. of tube heating surface) and removal pump equipment, and full advantage cannot be obtained from the heat in all of the blow steam until another heat-exchanger unit can be installed. This installation waits on the "duration."

The heat recovery obtained as given for item 9 on the data sheet is an estimate only of the recovery obtained based on the rated capacity and performance of the heat-exchanger equipment, assumed clean, and contributing its full output.

Mill 9. All of the steam from the digester is not condensed, because the heat exchanger is too small. It was designed for a 200-ton mill and production is now 270 tons. On account of the scarcity of material, a new heat exchanger cannot be secured at this time.

Conclusion

The TAPPI Heat Utilization in Chemical Processes Subcommittee will continue the study of heat utilization in sulphate pulping in its various phases.

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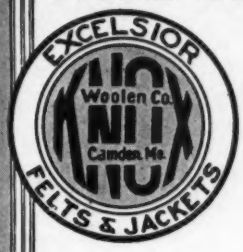

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PREVENTS AUCTION OF ABITIBI

(Continued from page 11)

against a previous price of $50, and the price was increased to a similar extent in Canada.

Operating Profits Lower in 1942

Operating profits of the company in 1942 amounted to $8,749,392, compared with $10,126,499 the year previous, and after showing $4,500,000 for depreciation, $3,166,994 for interest on bonds and interest on overdue interest, and reserves in connection with such payments, a surplus was shown of $330,714. Balance sheet figures show net working capital at $24,735,272, against $22,472,889 the year before. Bonds outstanding were reduced from $41,992,290 to $37,165,590.

The receiver reports that wood pulps produced/shipped by Abitibi totalled 113,758 tons, compared with 93,224 tons in 1941. Prices of bleached sulphite pulps in 1942 were, on the average, $76 per ton (U. S. funds) delivered — freight allowed — to U. S. destinations, against about the same price in 1941, with newsgrade at $64, about unchanged.

Sales of electric power by Abitibi to the public, and by the wholly-owned subsidiaries of the company to the public and Abitibi mills, amounted, in 1942, to $1,220,648.62, as compared with $1,213,456.56 in 1941 and $960,040.47 in 1940.

The offer made for the Espanola mill and properties of $975,000 cash was accepted Jan. 6 this year. In this connection, the receiver says "this sale required a write-off in 1943 of a book loss of $8,455,000," and adds: "Had the sale been completed in 1942, such loss would have exhausted the nominal surplus of period prior to receivership of $3,041,714—as shown on the balance sheet of Dec. 31, 1942—and created a deficit for such period of about $5,403,286.

Earnings Average Over $9 Million

Average earnings of Abitibi Power and Paper Company, Ltd., in the past three years available for depreciation and interest, etc., amounted to $9,020,000, according to figures contained in an analysis of the company's affairs made by Milner, Ross and Co. On this base it is calculated that after allowing $1,785,000 for depreciation, mentioned in the report of the royal commission, interest at 5%, plus premium, of $3,452,000 and income taxes of $1,000,000 per annum, earnings per 7% and 6% preferred share are indicated of $7.75. On the same base, the analysis says, bonds were earned 2.6 times, before depreciation, and 2.1 times after depreciation.

"Although production may decrease and costs rise in 1943," the analysis advises, "the company received the benefit of a $4 per ton increase in the price of newsprint, effective March 1, last."

Bevis Co. Gets Maritime "M"

The Maritime "M" pennant and Victory Fleet flag were presented to the Bevis Machine Company in a colorful ceremony recently, honoring this peacetime manufacturer of paper mill equipment for its remarkable record in turning out ship shafts and other heavy precision parts for the Ships-for-Victory program.

In making the award, Allen D. MacLean, assistant director of production for the Maritime Commission, told the Bevis organization that "such firms as yours, who do the unusual, firms who go beyond the expected production, are the backbone of the Maritime Commission's success." He reported that the Commission had met its 1942 goal of 8,000,000 deadweight tons of shipping and was well on its way towards the 1943 goal of 19,000,000 tons, plus 1,500,000 tons of auxiliary and military craft, amounting to nearly 2,000 ships.

Stanley G. Bevis, company president, and Stanley Ward, 42-year employee, made acceptance addresses. All employees received Maritime "M" pins. Other speakers included Lieutenant Governor Paul M. Herbert of Ohio; Howard W. Thrusher, chairman of the Middletown city commission; and Ensign J. C. Jahn of the Cincinnati Martime Service office. A buffet supper and reception followed the ceremony.

IMPCO Gets Coveted "E" Award

In recognition of its important production work for the Navy for nearly two years, the Improved Paper Machinery Corporation, Nashua, N. H., was honored on July 6 as the first concern in their city to be awarded the Army-Navy "E" pennant and pins.

The presentation ceremonies were attended by many distinguished guests including Governor Robert O. Blood, U. S. Senator Charles W. Toby, Mayor Eugene H. Lemay, Capt. John Hyland, U. S. N., Inspector of Navy Materiel, Boston, and Col. John I. Moore, U. S. Air Corps, C. O., Grenier Field, Manchester.

Presentation of the award to the corporation was made by Capt. John J. Hyland. In his acceptance remarks Walter L. Barker, president of the Improved Paper Machinery Corporation, said in part:

"Our relations with the War Production Board in Washington, D. C., its Boston and Manchester branches, have been highly satisfactory and we are glad to have their representatives with us today. Our association with the Defense Plant Corporation of Washington and their New England representatives who are present today, has been of the highest character.

"The confidence of the many companies who have entrusted us with their work and the various concerns who have supplied an unceasing flow of critical materiel truly share in our honor today.

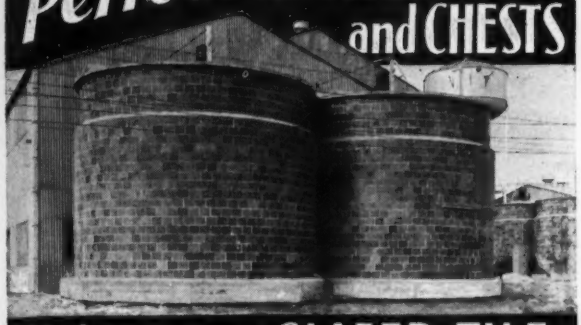
"All of the above would have been of no consequence had it not been for the untiring efforts, loyalty and cooperation of our workers."

"E" pin presentation to the workers was made by Col. John I. Moore, U. S. Air Corps, C. O., Grenier Field, Manchester.

Walkout Ended at Dolbeau

There has been another paper mill strike—this time lasting only for 40 hours—through jurisdictional labor union disputes in the pulp mills of the Lake St. John Power and Paper Company at Dolbeau, Que. On this occasion the dispute was over 18 men who had not paid their back dues to the international unions with which the company signed a labor agreement in 1941. The decision to return to work followed agreement between the rival labor organizations that the total of the back dues of the 18 employees would be deposited with the Commission now investigating paper mill strikes in the Lake St. John area, pending the recommendations of this committee.

Perfect for Stock TANKS and CHESTS



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Widely favored by paper mill executives—and immediately available.

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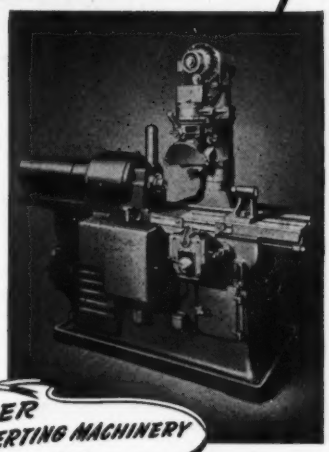

Automatic Hob sharpening machine built to design and specifications of Barber - Colman Company, Rockford, Illinois.

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While now Paper Converting Machines can only be made by special permission of the WPB, our engineering staff, and plant facilities are devoted to making tools and equipment that will aid our fighting forces. Much of this is precision work of a high degree. After we beat the Axis, we will be better equipped than ever before to meet requirements for paper converting machinery. Until that day, we shall do everything possible toward achievement of ultimate Victory.

PAPER CONVERTING MACHINE CO.
GREEN BAY, WISCONSIN
Manufacturers of paper converting machinery for all purposes.

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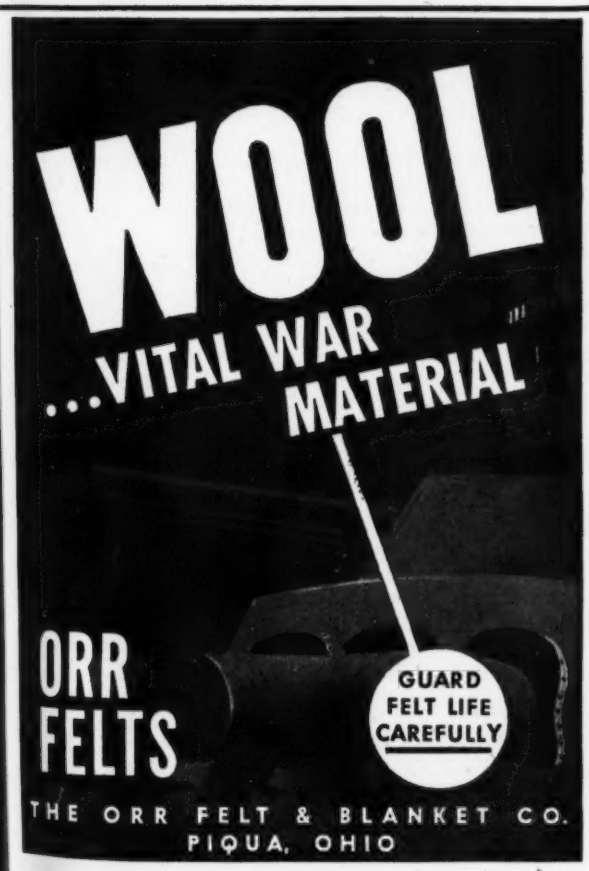

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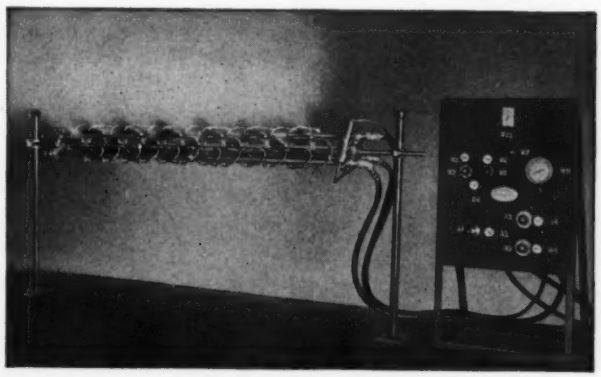

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The equipment can be designed to fit any specified width of web. Different types and sizes of spray heads provide ample capacity for any situation.

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118 Central St. Somerville, Mass.

New York Paper and Pulp Market Review

Wood Pulp Supply Situation Appears Serious For Future With No Adequate Means Being Taken Now to Overcome Deficit—Waste Paper Market is Strong—Old and New Rag Markets Are Active.

Office of the PAPER TRADE JOURNAL.
Wednesday, July 14, 1943.

Uncertain prospects for the future, with current reports indicating a short supply of pulpwood this year and a worse situation expected next year, are important highlights in current reports. The serious wood pulp situation is another deterrent factor, in the critical industrial and trade situation.

The background of unfavorable news is reflected in some of the reports received from many manufacturers, representatives, jobbers, and general paper merchants this week. As the outlook for obtaining paper becomes more uncertain, demand for it increases. This is now the reported case and demand for virtually all types of paper is beginning to reflect the limited value of allocations to meeting a growing tight paper market.

Paper production for the week ended July 3 was estimated at 80.0%, compared with 67.6% for 1942, with 72.8% for 1941, with 69.0% for 1940, and with 56.3% for the holiday week of 1939.

Paper board production for the week ended July 3 was 92.0%, compared with 59.0% for 1942, with 74.0% for 1941, with 60.0% for 1940, and with 42.0% for the corresponding week for 1939.

Wood Pulp

An indication of the serious situation in the supply of wood pulp, particularly chemical pulps, is reflected in the report of the American Paper and Pulp Association. It points out that last year the U. S. pulp output of 10,300,000 tons was increased by imports of 1,200,000 tons, providing an available supply of 11,500,000 tons. Total U. S. production this year is not expected to be over 8,800,000 tons, imports about 1,200,000 tons, providing a total of 10,000,000 tons, against an estimated consumption of 11,000,000 tons.

Rags

Mill buying of new cotton rags is active. The major interest is in the colored grades. Prices on these grades are well maintained at full ceiling prices. Demand is lagging for new whites, which continue below ceiling prices.

Mill buying of the roofing grades is active. All grades of old cotton rags are in good demand and prices are well maintained at ceiling levels.

Old Rope and Bagging

Mill requirements for old No. 1 Manila and other grades of hemp fiber material continue heavy in view of the limited supplies available. Prices are strong at ceiling levels.

The old bagging market is still reported in a confused state. The recent WPB ruling limiting the consumption of jute materials to southern manufacturers for cotton bale covering, is widely reported as considered in the trade as discriminatory. Prices of bagging continue nominal.

Old Waste Paper

The unfavorable long range outlook for an adequate wood pulp supply, has naturally exerted an influence on the paper stock market, which is increasingly active this week. Current reports indicate that packers are experiencing difficulty in getting sufficient labor to handle normal tonnages. Current mill demand is expected to continue to broaden out rapidly as the supply of wood pulp becomes tighter. Quotations are firm at ceiling prices.

Twine

Demand is heavy for all grades of twine. Government requirements continue to take all but a very limited supply of hemp fiber twine and cordage. Prices are very firm on all grades.

Publishers Oppose Higher Newsprint

An additional $6 a ton rise in the price of Canadian and United States newsprint has been strongly opposed by a group of newspaper publishers, who attended a conference in New York on Thursday with Office of Price Administration officials, reports yesterday indicated. The publishers apparently were not willing to concede that any price ris should follow the $4 a ton increase of last March, but argued that if the ceiling were to be lifted, the increase should be much less than $6, which would bring the base price here to $60 a ton.

Both the Canadian and United States newsprint producers contended that their costs have risen sharply. The former also pointed out that the reduction in their shipments to this country would necessitate a cutback of production, also contributing to a cost increase. The shipments have now been reducedt to 210,000 tons monthly whereas recently they had been as high as 240,000 tons.

Further meetings are scheduled to be held in Montreal or Toronto between officials of the OPA and the Canadian Wartime Prices and Trade Board before a final decision is reached. Newsprint producers complained that this would mean another "run-around," similar to the one which took place for months before the last increase was granted.

Publishers are opposing the increase on the ground that it would add further to their costs and necessitate additional increases in advertising rates, which they do not want to put into effect at this time.

While an increase of $4 a ton was made last March, lifting the ceiling to a basis of $54 a ton, some of the United States manufacturers who supply about 25 per cent of the newsprint used in this country have asked an additional $5 to $6. Early last month the O. P. A. said a Canadian price official had indicated Canadian interests also felt a further increase was necessary to meet production costs.

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This grade of TiO_2 shows highest developments of aqueous dispersion and suspension yet attained.

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Sole Selling Agents:
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Carbon blacks with a high degree of miscibility especially adapted to the needs of the paper industry. Supplied uncompressed, semi-compressed or in bead form.

BLAC-KING 45 RX

An aqueous dispersion of Carbon Black with a solid content of 45%. Especially designed for use as a coloring agent for paper. Clean to handle and eliminates contamination of other colors in the beater room.

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AMORPHOUS WAXES
Melting Points 120° F. to 205° F.

For the Manufacture of

LAMINATING PAPER . . GLASSINES . . WATERPROOFING . . GREASE PROOFING . . EXTENDERS FOR PARAFFIN, FOOD CONTAINERS, CONTAINER LININGS, ADHESIVENESS AND PROTECTIVE COATING.

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MAKE GOOD PAPER

APPLETON WOOLEN MILLS
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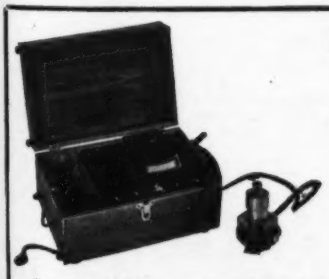
MISCO "C"

THE CORROSION RESISTANT ALLOY

CAST • ROLLED • FABRICATED
for all equipment exposed to corrosion by sulphite acids
MICHIGAN STEEL CASTING CO., DETROIT, MICH.



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PAPER MILL MACHINERY

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL.
Wednesday, July 14, 1943.

BLANC FIXE—Quotations on blanc fixe are firm and continue unchanged at prevailing market levels. The pulp is currently quoted at $40 per ton in barrels, at works; and powder is offered at $60 per ton, f.o.b., works. Demand reported fair for the week.

BLEACHING POWDER—Prices on bleaching powder are firm. Current demand reported active. Bleaching powder is currently quoted at $2.50 per 100 pounds, in drums, at works.

CASEIN—OPA maximum prices on processed acid-precipitated casein are as follows: 10,000 pounds or more, 24 cents per pound; 2,000 pounds, 24¼ cents per pound; less than 2,000 pounds, 24¾ cents per pound, f.o.b., shipping point.

CAUSTIC SODA—Prices on caustic soda are reported unchanged. Demand for the current week is reported steady. Solid caustic soda is currently quoted at $2.30 per 100 pounds; flake and ground at $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—Quotations on china clay are firm and continue unchanged. Demand reported fair for the current week. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay is quoted at from $12 to $22 per ton at mine. Imported clay is quoted at from $13 to $25 per long ton, ship side.

CHLORINE—Quotations on chlorine unchanged. Government demand for war use continues heavy. Prices firm. Chlorine is currently quoted at from $1.75 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—Quotations on some grades of rosin are lower for the current week. "G" gum rosin is currently quoted at $3.59 per 100 pounds in barrels, Savannah. "FF" wood rosin is currently quoted at $3.51 per 100 pounds in barrels, New York. Seventy per cent gum rosin size is currently quoted at $3.78 per 100 pounds, f.o.b., works.

SALT CAKE—Prices on salt cake are firm. Demand reported light for the current week. Domestic salt cake is currently quoted at $15 per ton in bulk; chrome salt cake at $16 per ton. All prices in car lots, f.o.b., shipping point.

SODA ASH—Quotations on soda ash are firm and continue to conform to prevailing market quotations. Demand active. Quotations on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Prices on corn starch are unchanged for the current week. Supply situation tight. Pearl is currently quoted at $3.10 per 100 pounds; powdered starch at $3.20 per 100 pounds. All prices in bags, car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are firm. Supply situation easy for the current week. The commercial grades are currently quoted at $1.15 per 100 pounds; iron free at from $1.75 to $1.85 per 100 pounds, in bags, car lots, f.o.b., works.

SULPHUR—Prices of sulphur are firm and continue to conform to prevailing market quotations. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are quoted at $18 per ton.

TALC—Quotations on talc are firm and continue unchanged at prevailing market prices. Domestic talc is currently quoted at from $16 to $21 per ton, at mills. No quotations on imported talc.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

News, per ton—			
Roll, contract	*$54.00	@	—
Sheets	62.00	"	—
* OPA Maximum Price.			
Kraft—per cwt.—Carload Quantities Zone A, f.o.b. Mill			
Superstandard Wrapping	*$5.25	@	—
No. 1 Wrapping	*5.00	"	—
Standard Wrapping	*4.75	"	—
Standard Bag	*4.375	"	—
* OPA Manufacturers' Prices.			
Tissues—Per Ream—Carlots			
White No. 1	1.12½	"	—
White No. 1 M. G.	1.10	"	—
White No. 1½	1.00	"	—
White No. 2	.90	"	—
Anti-Tarnish M.F.	1.20	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—
Toilet—1 M. Sheets—Per Case			
Unbleached	4.25	"	—
Bleached	5.70	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet	5.70	"	—
Paper Towels, Per Case—			
Unbleached, Jr.	2.60	"	—
Bleached, Jr.	3.20	"	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	11.25	@	—
No. 1 Manila Wrapping, 35 lb.	6.00	"	6.25
No. 2 Manila Wrapping, 35 lb.	5.75	"	6.00
Boards, per ton—			
News	*48.00	@	—
Chip	*45.00	"	—
Sgl. Mla. Ll. Chip	*60.00	"	—
White Pat. Coated	*75.00	"	—
Kraft Liners 50 lb.	*63.00	"	—
Binders Boards	84.00	"	116.00

* OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5.; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—
White, Assorted Items,
Delivered in Zone 1:

	Bonds	Ledgers
100% Rag Ext. No. 1	$39.10@$46.00	$40.25@$47.25
100% Rag	32.20 " 37.75	33.35 " 39.25
85% Rag	.... "	29.90 " 35.00
75% Rag	23.00 " 27.00	24.15 " 28.25
65% Rag	.... "	22.80 " 27.75
50% Rag	18.70 " 22.75	19.90 " 24.25
25% Rag	16.40 " 20.00	17.55 " 21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—
White, Assorted Items.
Delivered in Zone 1:

	Bonds	Ledgers
No. 1	$10.55@$12.75	$11.70@$14.25
No. 2	9.65 " 11.75	10.80 " 13.25
No. 3	9.20 " 11.25	10.35 " 12.50
No. 4	8.90 " 10.75	10.05 " 12.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—
White, Cased Paper.
Delivered in Zone 1:

No. 1 Glossy Coated	$13.65	@	$15.50
No. 2 Glossy Coated	12.40	"	14.00
No. 3 Glossy Coated	11.60	"	13.25
No. 4 Glossy Coated	11.15	"	12.75
No. 1 Antique (watermarked)	10.25	"	11.75
No. 2 Offset	9.60	"	11.00
A Grade E. F.	9.35	"	10.75
A Grade S. & S. C.	9.60	"	11.00
B Grade E. F.	8.85	"	10.25
B Grade S. & S. C.	9.10	"	10.50
C Grade E. F.	8.55	"	9.75
C Grade S. & S. C.	8.80	"	10.00
D Grade E. F.	8.25	"	9.50
D Grade S. & S. C.	8.50	"	9.75

Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers Prices, Less Freight to Destination.

Bl. Softwood Sulphite	$76.00		
Unbl. Softwood Sulphite	65.00	@	66.00
Bl. Hardwood Sulphite	73.50		
Unbl. Hardwood Sulphite	63.50		
Bl. Mitscherlich	81.00		
Unbl. Mitscherlich	72.00		
N. Bleached Sulphate	86.00		
S. Bleached Sulphate	79.00		
N. Semi-Bleached Sulphate	82.00		
S. Semi-Bleached Sulphate	75.00		
N. Unbl. Sulphate	73.00		
S. Unbl. Sulphate	63.50		
Bl. Soda	66.00		
Unbl. Soda	62.00		
Groundwood	46.00		

Transportation Allowances
Applying to Producers of Wet Wood Pulp.

	Below 50% Air Dry Weight
Northeast	$13.50
Lake Central	13.50
Southern	16.00
West Coast (in area)	10.50
West Coast (out area)	16.50

	50%-80% Air Dry Weight
Northeast	$11.50
Lake Central	11.50
Southern	14.00
West Coast (in area)	9.50
West Coast (out area)	15.50

Applying to Producers of Dry Wood Pulp.

	Above 80% Air Dry Weight
Northeast	$8.50
Lake Central	8.50
Southern	11.00
West Coast (in area)	7.50
West Coast (out area)	13.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum prices.

Domestic Rags

New Rags
(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	6.50	@	7.25*
Silesias No. 1	—	"	5.75*
New Unbleached	6.75	"	7.50*
Blue Overall	—	"	5.50*
Fancy	—	"	3.50*
Washables	—	"	3.00*
Bleached Khaki Cuttings	—	"	4.25*
Unbleached Kh Cuttings	—	"	3.50*

* OPA Maximum Prices.

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THE MOST ECONOMICAL FILLING THAT CAN BE PUT IN A MORTISE WHEEL

Ready Dressed Blank Head

WE MAKE ANY STYLE OR SIZE WANTED

WRITE FOR INSTRUCTION SHEET "C" WHICH IS FREE

QUICK SERVICE ON ALL SIZES

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of faithful service to the paper industry, we have temporarily ceased manufacturing new equipment and are devoting the greater part of our resources to the war effort. With the proper authority, however, you can still obtain replacements.

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The Trade-Mark of

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CLINTON

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SPECIAL GRADES FOR BEATER, CALENDER AND TUB SIZING

- QUALITY
- UNIFORMITY
- SERVICE

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Slitters and Roll Winders

Built to stand the grind of high speed quality production. For every grade of paper there's a size and type to meet your needs.

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For High-Speed, Dependable

PAPER CONVERTING MACHINES

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Paper Bag Machines, Aniline & Oil-Ink Presses, Waxing, Gluing, Varnishing, Laminating Machines.

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SCREENS of Perforated Metal

The Harrington & King Perforating Co.

5652 Fillmore St., Chicago, 44, Ill. 114 Liberty St., New York, 6, N. Y.

Old Rags

White, No. 1—
Repacked .....*3.80 " —
Miscellaneous ....*3.20 " —
White, No. 2—
Repacked .....*2.90 " —
Miscellaneous ....*2.65 " —
Third and Blues—
Repacked .....*2.20 " —
Miscellaneous ....*1.80 " —
Roofing Rags—
No. 1.....*1.55 " —
No. 2.....*1.45 " —
No. 3 (bagging)..*1.35 " —
No. 4.....*1.35 " —
No. 5A.....*1.35 " —
Old Manila Rope.. 5.75 " —
OPA Maximum Prices.

Foreign Rags

All Prices nominal

New Rags

New Dark Cuttings.. 2.25 @ 2.40
New Mixed Cuttings. 2.00 " 2.20
New Light Silesias.. 5.50 " 5.75
Light Flannelettes... 5.50 " 5.75
New White Cuttings. 7.00 " 7.50
New Light Oxfords. 4.00 " 4.50
New Light Prints... 3.00 " 3.25

Old Rags

No. 1 White Linens. 7.50 " 8.50
No. 2 White Linens. 6.50 " 7.50
No. 3 White Linens. 4.50 " —
No. 4 White Linens. 2.25 " 3.25
No. 1 White Cotton. 4.25 " 4.75
No. 2 White Cotton. 3.25 " 3.75
No. 3 White Cotton. 2.50 " 3.00
No. 4 White Cotton. 1.90 " 2.20
Extra Light Prints.. 2.00 " 2.40
Ord. Light Prints... 1.75 " 2.15
Med. Light Prints... 1.55 " 1.95
Dutch Blue Cottons. 2.25 " 2.50
French Blue Linens. 3.00 " —
Checks and Blues... 2.00 " —
Linsey Garments.... 1.90 " 2.00
Dark Cottons..... 1.50 " 1.60
Old Shopperies..... 1.30 " 1.45
New Shopperies..... 1.45 " 1.50
French Blues..... 2.25 " 2.50

BAGGING

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—
Foreign .....Nominal
Domestic ..... 4.25 @ 4.35
Wool Tares, light.... 4.25 " 4.50
Wool Tares heavy.... 4.50 " 5.00
Bright Bagging..... 4.50 " 4.85
Manila Rope—
Foreign ..... — " —
Domestic .....*5.75 " —
Jute Threads..... 5.50 " —
No. 1 Sisal Strings..*4.00 " —
Mixed Strings..... 2.00 " —
* OPA Maximum Price.

Old Waste Papers

(F. o. b. New York)
OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut ..... 3.37½@ —
No. 1 Hard White Envelope Cuts.... 3.12½" —
No. 1 Hard White Shavings, unruled. 2.87½" —
No. 1 Hard White Shavings, ruled... 2.50 " —
Soft White Shavings, one cut..... 2.87½" —
No. 1 Soft White Shavings ..... 2.50 " —
Soft White Shavings, Misc. ..... 2.15 " —
No. 1 Fly Leaf Shavings ..... 1.67½" —
No. 2 Fly Leaf Shavings ..... 1.12½" —
No. 1 Groundwood Fly Leaf Shavings 1.25 " —
No. 2 Mixed Groundwood Fly Leaf Shavings ..... .90 " —
Mixed Colored Shavings ..... .75 " —
Mixed Groundwood Colored Shavings.. .90 " —
Overissue Magazines ..... 1.67½" —
No. 1 Heavy Books & Magazines..... 1.57½" —
Mixed Books..... .85 " —
No. 1 White Ledger 2.17½" —
No. 2 Mixed Ledger, colored ..... 1.87½" —
New Manila Envelope Cuttings, one cut.. 2.87½" —
New Manila Envelope Cuttings ..... 2.65 " —
Extra Manilas..... 1.85 " —
Mixed Kraft, Env. & Bag Cuttings..... 2.75 " —
Kraft Envelope Cuttings ..... 3.25 " —
Triple Sorted, No. 1 Brown Soft Kraft. 2.50 " —
New 100% Kraft Corrugated Cuttings.. 2.25 " —
No. 1 Assorted Old Kraft ..... 1.75 " —
New Jute Corrugated Cuttings ..... .90 " —
Old 100% Kraft Corrugated Containers 1.75 " —
Old Corrugated Containers ..... 1.15 " —
Box Board Cuttings. .72½" —
White Blank News.. 1.65 " —
Overissue News..... .85 " —
No. 1 News..... .75 " —
No. 1 Mixed Paper. .70 " —
Old Corrugated Containers ..... .82½" —
Mill Wrappers..... .85 " —

Twines

(F. o. b. Mill)
(Soft Fiber)

Coarse Polished—
India ..... .21 @ —
White Hemp..... .21 " —
Fine Polished—
Fine India..... .26 " —
Unpolished—
Box ..... .17½" —
Paper Makers..... .17 " —
Tube Rope..... .19 " —
Wall Paper..... .20½" —
Wrapping ..... .23 " —
Soft Fiber Rope... .19 " —
Cotton ..... .25 " —

(Hard Fiber)

Medium Java..... .18 " —
Mex. Sisal..... .16 " —
Manila ..... " —

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—
New White No. 1. .07¼@ .07½
New White No. 2. .04½" .05
Light Silesias..... .04½" .04¾
Silesias, No. 1.... .04 " .04¼
Black Silesias, soft .03¾" .04
New Unbleached.. .07¼" .07½
Washable Prints... .03¾" .03½
Washable No. 1.. .02 " .02¼
Blue Overall..... .04½" .05½
Cottons—According to grades—
Washable shredding — " .01¾
Fancy Percales.... .03¼" .03½
New Black Soft... .02¾" .03
New Dark Seconds 1.75 " 2.00
Khaki Cuttings—
No. 1 O. D..... .03 " .03¼
No. 2 Mixed..... .02¼" .02½
Corduroy ..... .01¾" .02¼
New Canvas..... .04¾" .05¼
New Black Mixed. — " .02½

Domestic Rags (Old)

White No. 1—Repacked ..... 3.80 " —
White No. 2—Repacked ..... 2.90 " —
Miscellaneous No. 1. 3.20 " —
Miscellaneous No. 2. 2.65 " —
Thirds and Blues—
Miscellaneous .... 1.80 " —
Repacked ..... 2.20 " —
Black Stockings—
(Export) .....Nominal
Roofing Stock—
Foreign No. 1....Nominal
Domestic No. 1... 1.55 " —
Domestic No. 2... 1.45 " —
Roofing Bagging.. 1.35 " —
Old Manila Rope... 5.75 " —

Bagging

(F. o. b. Phila.)

Gunny No. 1—
Foreign .....Nominal
Domestic ..... 3.00 " 3.50
Sisal Rope..... 3.75 " —
Mixed ..... 1.00 " 1.50
Scrap—
No. 1..... 3.25 " 3.50
No. 2..... 1.75 " 1.80
Wool Tares, heavy... 4.00 " 4.25
No. 1 New Light Burlap ..... 3.00 " 4.00
New Burlap Cuttings 3.75 " 4.00

Old Papers

(F. o. b. Phila)
OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut ..... 3.37½" —
No. 1 Hard White Shavings, unruled.. 2.87½" —
Soft White Shavings, one cut..... 2.50 " —
White Blank News.. 1.65 " —
Soft White Shavings, Misc. ..... 2.15 " —
No. 1 White Ledger. 2.17½" —
No. 2 Ledger, colored 1.87½" —
No. 1 Heavy Books & Magazines .... 1.67½" —
Overissue Magazines. 1.67½" —
New Manila Envelope Cuttings ..... 2.65 " —
No. 1 Assorted Old Kraft ..... 1.75 " —
No. 1 Mixed Paper. .70 " —
Box Board Cuttings. .72½" —
Kraft Corrugated Cuttings ..... 2.25 " —
Old Corrugated Containers ..... 1.15 " —
Overissue News..... .85 " —
No. 1 News..... 1.00 " —

BOSTON

Old Papers

(F. o. b. Boston)
OPA Maximum Prices

No. 1 Hard White Shavings, unruled. 2.87½@ —
No. 1 Hard White Shavings, ruled... 2.50 " —
Soft White Shavings, Misc. ..... 2.15 " —
No. 1 Fly Leaf Shavings ..... 1.67½" —
No. 2 Fly Leaf Shavings ..... 1.12½" —
No. 1 Groundwood Fly Leaf Shavings 1.25 " —
No. 2 Groundwood Fly Leaf Shavings .90 " —
Mixed Colored Shavings ..... .75 " —
New Manila Envelope Cuts, one cut..... 2.87½" —
Hard White Envelope Cuts, one cut..... 3.37½" —
Triple Sorted No. 1 Brown Soft Kraft. 2.50 " —
Mixed Kraft Env. & Bag Cuttings..... 2.75 " —
Kraft Envelope Cuttings ..... 3.25 " —
No. 1 Heavy Books & Magazines..... 1.57 " —
New Manila Envelope Cuts, one cut..... 2.87½" —
New Manila Envelope Cuttings ..... 2.65 " —
White Blank News.. 1.65 " —
No. 1 Assorted Old Kraft ..... 1.75 " —
No. 1 Mixed Paper. .70 " —
Overissue News..... .85 " —
Box Board Cuttings. .72½" —
New Corrugated Cuttings, Kraft..... 2.25 " —
Old 100% Kraft Corrugated Containers 1.75 " —
Old Corrugated Containers ..... 1.15 " —
Jute Corrugated Cuttings ..... 1.07½" —

Bagging

(F. o. b. Boston)

Gunny Bagging—
Foreign .....(nominal)
Domestic ..... 3.75 @ 4.00
Sisal Rope No. 1....*4.75 " —
Sisal Rope No. 2....*4.25 " —
Mixed Rope..... 1.35 " 1.50
Transmission Rope—
Foreign .....(nominal)
Domestic ..... 2.75 " 3.00
Manila Rope—
Foreign .....(nominal)
Domestic ..... 5.75 " —
Soft Jute Rope..... 4.50 " 5.00
Jute Carpet Threads. 3.00 " 3.50
Bleachery Burlap.... 8.50 " 9.00
Scrap Burlap—
Foreign .....(nominal)
Domestic ..... 3.60 " 3.85
Wool Tares—
Foreign .....(nominal)
Domestic ..... 4.25 " —
Aust. Wool Pouches. 4.65 " 4.87½
New Burlap Cuttings 4.75 " 5.00
Heavy Baling Bagging 4.00 " 4.25
Paper Mill Bagging.. 2.50 " 3.00
No. 2 Bagging..... 1.35 " —*
* OPA Maximum Price.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—
New Light Prints. .04½@ .04¾
Fancy Percales.... .04¾" .05
New White No 1. .06¾" .07
New Light Flannelettes ..... .05½" .06
Canton Flannels, Bleached ..... .06 " .06½
Underwear Cutters, Bleached ..... .06¾" .06¾
Underwear Cutters, Unbleached ..... .05¾" .06
Silesias No. 1..... .06 " .06¼
New Black Silesias.. .03 " .03½
Red Cotton Cuttings .03½" .04
Soft Unbleached ... .06½" .06¾
Blue Cheviots .... .05½" .06
Fancy ..... .02¾" —
Washable ..... .02¾" —
Khaki Cuttings .... .02¾" .03
O. D. Khaki..... .03½" .03¾
Corduroy ..... .03¼" .03½
New Canvas ..... .06¼" .06¾
B. V. D. Cuttings... .06¼" .06¾

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—
Repacked ..... 3.80 @ —*
Miscellaneous .... 3.20 " —*
White No. 2—
Miscellaneous .... 2.65 " —*
Twos and Blues, Repacked ..... 2.20 " —*
Old Blue Overalls... 2.25 " 2.50
Thirds and Blues, Repacked ..... 2.20 " —*
Miscellaneous ..... 1.80 " —*
Black Stockings ..... 3.50 " 4.00
Roofing Stock—
No. 1 ..... 1.55 " —*
No. 2 ..... 1.45 " —*
No. 3 ..... 1.35 " —*
No. 4 ..... 1.35 " —*
No. 5, Quality A.. 1.35 " —*
Quality B.. 1.20 " —*
Quality C.. .95 " —*
* Old Manila Rope.. 5.75 " —
* OPA Maximum Prices.

Foreign Rags

(F. o. b Boston)

Canvas .....(nominal)
Dark Cottons .....(nominal)
Dutch Blues .....(nominal)
New Checks and Blues..(nominal)
Old Fustians .....(nominal)
Old Linsey Garments....(nominal)
New Silesias .....(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)
OPA Maximum Prices.

Shavings—
No. 1 Hard White Envelope Cuts, one cut ..... 3.37½" —
No. 1 Hard White Shavings, unruled. 2.87½" —
No. 1 Soft White Shavings ..... 2.50 " —
No. 1 White Ledger 2.17½" —
No. 1 Heavy Books & Magazines ..... 1.67½" —
White Blank News.. 1.65 " —
Mixed Kraft Env. & Bag Cuttings... 2.75 " —
No. 1 Assorted Old Kraft ..... 1.75 " —
Overissue News .... .85 " —
No. 1 News..... .75 " —
No. 1 Mixed Paper.. .70 " —
No. 1 Roofing Rags. 1.55 " —
No. 1 Roofing Bags. 1.45 " —